US Army Corps of Engineers®

HEADQUARTERS
DIRECTORATE OF CIVIL WORKS &
DIRECTORATE OF MILITARY PROGRAMS

ENGINEERING & CONSTRUCTION NEWS

VOLUME 1 NUMBER 6 JUNE 1999

JUNE'S THEME: Engineering/Construction Technology

DWIGHT'S NOTES

The theme of this month's newsletter is Engineering and Construction Technology. Webster defines technology as "the application of (scientific) knowledge to practical purposes." The Corps engineering and construction technology includes research (acquiring knowledge), criteria (interpreting knowledge), tools and methods (packaging knowledge), and products/services (applying knowledge). Technology does not necessarily equate to innovation, though, for technology can be old or new. Innovation is by definition the "introduction of something new".

Our challenge in the Corps is to constantly evaluate whether the state of our technology, old and new, is adequate to meet current and future requirements. When it is not adequate we must respond with further technological investments or face the consequences of decline. In my opinion, the state of our technology is, at best, a mixed bag.

You will read in this edition about some top-notch new technology that is working its way into the Corps. We must, in Charlie Cheung's words, celebrate that news. We also continue to use some "old" technology, imbedded in tried-and-true criteria, which has and will stand the test of time. Yet, we know of instances where we cannot keep up with changing times. Causes stem from a risk averse culture or, just as often, lack for resources to continually update the full suite of our imbedded technology.

We must change this culture, select the right technology from in-house and public domain sources, and change our budget priorities to invest in technology that will get us where we want to go. When given the opportunity to test, evaluate, and implement new technology I suggest we refer to the Commander's Intent in the "White Book" wherein our Chief says: "I see a bold, vibrant organization…with a worldwide reputation for excellence and mission accomplishment…we must strike out boldly…we must dramatically transform our approaches to our customers, business and processes".

General Ballard's message is pretty simple on this account: "Don't be shy… be bold!"

CARL'S NOTES

I am very pleased that the field offices have come through with a number articles on how they are using Engineering/Construction Technology today. This reinforces main reason for publishing these notes, which is to share information. I hope to see more articles from other Districts and Divisions in future issues.

CARL'S NOTES (CONTINUED)

GIS technology is used daily to support the Corps mission. GIS is entrenched in our mission and we use it to do everything from simply identifying where all the Corps projects are located to performing complex analysis on dredged material placement to managing water on the Mississippi River. For years, the Corps has quietly reaped the benefits of GIS technology through improved information processing, better quality decisions, and significant reductions in labor. It is an important collection, management and visualization tool for geospatial information; however, to realize the full benefits of the technology, the USACE geospatial information user community must become broader and we need to align GIS with Corps business areas. For many years, GIS technology was cumbersome and only a few highly trained specialists where able to use geospatial technology. However, recent software advancements have allowed for easier access to databases, integrated analysis using what had been, traditionally, non-spatial data, and improved user interfaces. The next few years promise to make it even easier for "non GIS types" to reap the benefits of GIS technology and it is realistic to expect a GIS on desktops throughout the Corps. GIS is a vital technology the Corps relies on to get the job done and it will only become increasingly more important as the technology further advances.

At HQUSACE we are working with the Tri-Service CADD/GIS Technology Center to expand that use of these new technologies. Our Federal account executives have been briefed on our uses of CADD/GIS in order to help sell the benefits of using the Corps of Engineers to support other Federal agencies.

As these technologies expand and other new technologies enter the work place, I see the future of the Corps of Engineers to be as exciting as we enter the next century. In possibly more exiting than Brigadier General John Wilson must have viewed the Corps future as it entered the century that is now ending.

Another way we can influence and shape the future of the engineering profession is through engagement with various professional societies. Dwight and I are dedicated to increasing the Corps participation in the professional societies. As a first step toward that goal, we have been discussing with the American Society of Civil Engineers (ASCE) various options to make membership more affordable for our younger engineers. More government employees as members means more exposure to civil engineering practice, networking with fellow engineers, and in general more opportunity to influence the future of engineering profession. More government employees as members will also help broaden the ASCE's outlook and help the Society to advance the profession further and faster. Within the next several months, we will be announcing the results of our efforts and provide you with specific information.

ARTICLES

THIS PUBLICATION WILL BE ISSUED ON A MONTHLY BASIS AND DISTRIBUTED BY E-MAIL AND POSTED ON THE INTERNET AT HTTP://WWW.HQ.USACE.ARMY.MIL/CEMP/C/CEMP-C.HTM AND HTTP://WWW.USACE.ARMY.MIL/INET/FUNCTIONS/CW. IF YOU WOULD LIKE TO CONTRIBUTE ARTICLES OR HAVE SUGGESTIONS FOR FUTURE ARTICLES, PLEASE CONTACT DENISE MASSIHI, CEMP-EC, 2020-761-1380 OR CHARLES PEARRE, CECW-EP, 202-761-4531.

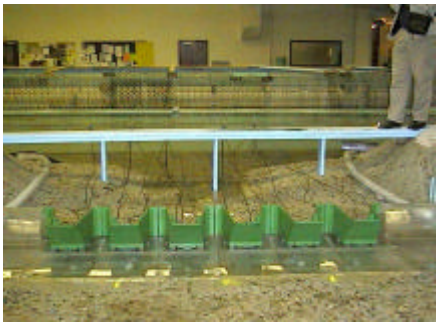
Engineering/Construction Technology

FUSEGATE SPILLWAY, LAKE KAWEAH, CALIFORNIA

An unusual solution to increasing reservoir capacity for additional flood control protection and water supply is being investigated by Sacramento District. The feasibility studies for increased capacity at Lake Kaweah identified a 21 foot spillway raise to be accomplished using a fixed weir, ogee spillway. The spillway would be widened from its present width of 300 feet to 455 feet to pass the PMF. During PED studies it was found that the increased cost of mitigation and spillway excavation resulted in a borderline project. To improve net benefits Sacramento District investigated alternative spillway types to reduce excavation costs, and determined the fusegate spillway was the most economical and reliable. Fusegates are a product of the French firm, Hydroplus, Inc. Hydroplus has installed fusegates on approximately 30 dams worldwide, including an irrigation dam in New Mexico. The fusegates are a non-mechanical, gravity only structure that resembles an open bucket. The weight of the fusegate

plus the weight of water within the "bucket" prevents the fusegate from tipping over even when overtopped during flood events. However, at a predetermined reservoir elevation, water enters a vertical pipe, which is housed within an intake well structure located at the right abutment. There are six vertical pipes in the intake well each set at an inlet elevation corresponding to the predetermined reservoir elevation at which each fusegate will tip. Each vertical pipe transitions to horizontal piping for supplying water to an empty "base" chamber at the bottom of each of the fusegates. Once the chamber fills with water the resulting uplift pressure is sufficient to tip the fusegate whereupon the gate is swept downstream. This allows for increased spillway capacity to pass the PMF.

Working closely with the local sponsor, it was determined that the fusegates could be designed so that tipping is not initiated until the 1,000 year flood event. Because the fusegates are 21 feet high, located in a long approach channel with a relatively flat exit channel, and overtopped by approximately 200,000 cfs at 25 feet of head before reaching the tipping level, it was determined that a physical model study was required. Utah State University was chosen to conduct the model study with oversight by WES and Dr. Henry Falvey, an expert in fusegate design.



The model study is at a scale of 1 to 30 with a model discharge of 61 cfs, corresponding to 300,000 cfs in the prototype. Four major concerns were addressed by the model study. The first concern was the effects of debris on tipping of the fusegates. The effects of tailwater and the high approach velocities were the second concern studied. With multiple gates, the ability of individual fusegates to tumble downstream without affecting the tipping of adjacent fusegates was a concern that had major effects on the ability of the structure to pass the maximum flow. The sensitivity of the fusegates to tipping if the upstream rubber seal at the base of the fusegate is damaged was also studied. The rubber seal is critical since water can enter the base chamber and develop uplift pressure prior to the design reservoir elevation, which can lead to early tipping. The fusegates are designed to accept a certain amount of leakage into the base chamber by inclusion of drain holes on the downstream wall. To minimize leakage, Sacramento District is requiring special construction methods to minimize the gap between the spillway sill and the base of the fusegate.

The model study will be completed in June 1999. Testing to date indicates that the hydrodynamics of the approach channel and exit channel are not significantly effecting the tipping of the fusegates. However, the high velocity in the approach channel caused a fluctuating water level in the intake well structure with the entrance located at the spillway abutment. It was necessary to use piping to extend the entrance into the reservoir proper in order to eliminate the fluctuating water level. The testing has also indicated that the fusegates will tumble sufficiently downstream so as not to affect the tipping of other gates. Remaining testing will address debris effects and the sensitivity of tipping to the upstream gap.

POC: CHARLES MIFKOVIC, CESPK-ED-D, 916-577-7254

Return to Index of Articles

USE OF SINGLE-HEAD MULTI-BEAM SURVEYING ON CORPS OF ENGINEERS' NAVIGATION PROJECTS IN THE LOS ANGELES DISTRICT

HISTORY: It seems that for hundreds of years we have surveyed with a sextant, tag line, and lead line. Then a few years ago we replaced the lead line with an echo sounder. This allowed the surveyor to collect data while on the move. Then the sextant and tag line were replaced by electronic positioning for the survey. This was done with either range/range or range/azimuth equipment that allowed data logging of the depths and the position. This was a big step in that for the first time the actual position of the sounding was recorded in an automated way. Then came the Global Positioning System (GPS). This eventually led to full time positioning systems accurate to +/- 0.5 to 5 meters. This allowed very quick mobilization and data collection with high reliability and a reduction in crew size. The Corps continued to press for things like On-The-Fly (OTF) Real Time Kinematics (RTK) systems. That technology has had a major impact on positional accuracy and an impact on the whole surveying industry. This technology permitted very quick and accurate surveys of large areas with fewer people needed to perform the task. When OTF-RTK is used on hydrographic surveying it allows the use of the ellipsoid (a mathematical description of the surface of the earth) as a datum to measure from in order to find various sea level datums in localized areas. This removes the need to monitor the tides and the use of the sea as the datum. At about the same time the Single Head Multi-Beam (SHMB) technology was making its way into the survey arena. The multi-beam manufacturers probably were unsure if their costly and demanding technology was going to be accepted by surveyors and those who use the surveys. However, when the ship, Queen Elizabeth II, struck a rock in a channel that had been surveyed and found to be clear of obstructions, the world changed. The government agency in charge of insuring that the channel was clear resurveyed the area with a SHMB system and found the obstruction. This demonstrated that SHMB surveys could provide a more complete picture of the site conditions than cross-section surveys as the method to find a channel clear of hazards. At about that time, in the early 1990's the Los Angeles District of the Corps of Engineers determined that the use of SHMB technology was sufficiently developed and cost effective to acquire and use.

USES: Originally the Los Angeles District was going to use the SHMB system on condition surveys and for checking rock structures. As we tested the system and saw how it compared with our Single Beam (SB) work, we moved on to using it for surveys used in contract documents. Later our confidence in the SHMB system reached a point where we felt comfortable with using it to survey for acceptance and quantities; we then used it in these surveys also. This technology allows for a complete survey of the underwater surface and not just a sampling. This complete bottom survey has allowed for greater confidence in the design and performance of the harbors in our District.

POSITIVES: There are both positive and negative aspects of SHMB systems. The positive aspects are very compelling. The biggest is the ability to collect data that accurately represents the entire bottom. This removes many of the conservative design and engineering issues that plague coastal engineers. Now they can see a more detailed surface. This is done with surfacing software that can render the data in many different ways and lend itself to various numeric displays. Some of these are simple fills and shading that give the impression of a mono-chrome photograph, color filled contours, contours of the areas above the planned surface, and many more. These are all used to help determine quantity of work, and quality of work. By the use of surface subtraction, normally referred to as TIN (triangulated irregular network) volumes, very accurate volume calculations can be performed. The use of cross-sections and average-end-area were very useful until computers made the use of the complete data sets practical. Determining volumes with cross-sections uses a sample of the bottom and extrapolates it to

represent the entire bottom, while a full coverage surveys provide the ability to calculate the volume from the actual shape of the bottom and the planned shape.

Another aspect deals with the actual bottom detection of SHMB systems compared with Single Beam (SB) systems. A SB system depends on the sound energy in the water column being accurately adjusted for the particular depth of the sounding. If the system has a fixed strength set for a depth of 40 feet, it will produce a very large diameter footprint in 20 feet of water. This tends to produce a bottom higher than it is in reality at the 20-foot depth. However, the SHMB systems preclude this from happening. This and the fact that the SHMB systems produce far more data that over lap, providing many ways to perform quality control and quality assurance. The higher resolution of SHMB system allows a trained eye to view contours and determine if an object or anomaly exists or whether it is an aberration of the equipment. With SB system, that same-trained eye has a problem determining from the single cross-section whether the object exists or not.

Operational concerns also arise from the use of SB systems. The operation of a SB system is generally perpendicular to the channel and thus cutting across other traffic. Another concern is how close the survey boat must get to structures to take measurements. With some SHMB systems the beams can be rotated and the structure measured from a safe distance.

The SHMB survey enhances construction management. If the manager or engineer in charge of construction has a reliable and accurate tool that can show in detail the performance of his crew and equipment, that manager or engineer should be able perform the construction better and quicker with less remedial work.

NEGATIVES: As my son always tells me, "For every silver lining there is always a dark cloud." The most obvious negative aspect of this new technology is the initial cost of the equipment, survey boat, and its operation. The cost of adequate boat and equipment is nearly $500,000. That is a lot of money for any organization and would require full justification. And if that organization can not see pay back, they usually will not move in that direction. Another deterrent is the cost of training and maintaining a trained crew. This new level of surveying technology requires a level of skill and training that was not previously required in the surveying field.

We must learn to evaluate the surveys as they are presented in a new and different format. Many feel they can only decipher their work with cross-section surveys and plots. It is difficult to make judgements from new presentations of the bottom surface. Once acclimated to the new atmosphere of total bottom surveys and the different visual methods to represent it, the engineering and construction personnel would favor the new formats as long as cross-section plots are still available.

A potential negative aspect of full bottom data is that the data can be analyzed to a greater detail than warranted. It is very inviting to analyze the data over and over with an ever-increasing level of detail. The prime objective of the analysis is sometimes left behind and forgotten as the analysis continues. It takes discipline to not over-analyze data and to realize when to quit. This aspect is probably one of the bigger concerns of the construction industry, but it is not one that the surveyor can change.

Project costs will probably increase, at least in the sort term, due to over analysis of data, higher complexity in the design, closer scrutiny during the construction of the project, and the additional costs

of surveys. However, over time these issues should normalize. The over analysis of data will recede as its newness diminishes and an appropriate level of data analysis is established. The design and engineering complexity will lead to better and more refined projects. Those who monitor construction will temper their reviews to achieve only the threshold requirements, the costs of the equipment will drop, and their value as an aid to the construction manager will compensate for the added operational costs.

OUR EXPERIENCE: From the first day it has been more positive than negative. We found that the data collection is nearly as easy as SB surveys however in shallow water (3 to 7 meters) the data collection will take up to twice as long. If the water depth is moderate (7 to 15 meters) the data collection will take about the same amount of time as SB surveys. In deeper water (15 to 30 meters) the data collection is as much as half the time as single beam data collection. The SHMB system will collect data everywhere the SB system will and more. The SHMB system will collect data under objects and nearer the shore (by angling beams more parallel to the water surface).

We have completed 37 SHMB surveys since 1995. Most of these surveys have been in support of dredging projects. We have performed compatibility surveys with our normal SB system and the SHMB system. Results indicate nearly identical values for volume calculations. If the bottom is irregular, the SB system seems to produce a slightly shallower bottom (approximately 0.2 ft. or 0.08 m., this varies with bottom type and shape), this may be due to a larger beam from the single head system. This would cause it to pick up and spread an isolated high spot over a larger area.

What is meant by near identical results is a general surface separation of .02m or less most of the time. In other words if the bottom is relatively smooth and flat the two surveys will produce surfaces when subtracted from each other and that difference is spread over the survey area it is usually about .02m. This difference in bottom separation is probably due to differences in tide readings, equipment drift, changes in the water column, and the way the equipment sees the bottom. For these reasons it is not advisable to mix surveys from different types or methods of surveying, especially for pay quantity surveys.

On a large construction project where most of the construction occurs below the water surface it is imperative to have the ability to "see" the bottom in great detail and make quick and accurate decisions. This was evident on the large Pier 400 project in Los Angeles Harbor, California. This was a very complex dredging and landfill project with very exacting requirements on where dredging was to occur and at what depth the material was to be removed. This required a full time survey effort with a combination of SB surveys and SHMB surveys over the entire area. The surveys over the last two years have produced thousands of cross sections and many plan views with contours, and different renderings in support of the project. All of these products were critical to meet the very aggressive schedule and still provide a quality construction product. It is hard to believe that this project could have been completed with out the use of the SHMB system.

Processing of the data once it is collected is quite different from the processing of the single beam system. First the editing process takes about twice the field data collection time, whereas single beam data changes those times to about a one to one ratio. Part of this delay is self-imposed. We require that automated filtering of data be very conservative. This leaves a lot of manual editing by cartographic personnel. This approach to editing is due to the importance that our data be accurate and

provide safe navigation when incorporated into the nations navigation charts. The abundance of data also makes it difficult to display on charts. We end up using representative depths, which is about one out of fifty or more, for charting purposes.

FUTURE: Making predictions is an easy way to be wrong, but predictions are a requirement for making advancements. History has shown that we will keep improving the way we measure our world and this new technology is just another step into the future. The Corps of Engineers will continue to want to know more and more about the surface under the water, and not just its shape, but its material type, density, and other subsurface characteristics in an ever expanding search for actual conditions and not merely samples or predicted conditions. The rate of change is becoming so quick that the district survey crews are told that they will probably not do the same project the same way twice.

The construction industry will find ways to incorporate this technology into their construction practices. They will use it to better control their crews and equipment to attain better efficiency. This increase in efficiency will offset the cost of implementation and incorporation into their business.

One thing is for sure; the future will not be boring.

POC: HARVEY W. BEVERLY, CESPL-ED-S, 626-401-4009

Return to Index of Articles

IMPLEMENTATION OF RMS-W AT HOLLOMAN AFB

The Albuquerque District is currently implementing the Windows version of RMS at the District's Southern Area Office at Holloman Air Force Base (HAFB). When fully implemented, RMS-W will provide a powerful construction management tool to take the place of the AMPRS and RMS DOS systems used by the Corps for many years. Implementation has been a frustrating experience for the District, but with the help of the Technical Center of Expertise for RMS, Albuquerque District Information Management specialists, and dedicated personnel at the Southern Area Office at HAFB, the light at the end of the tunnel is getting brighter.

HQUSACE directed implementation of RMS-W on August 7, 1998. The HQUSACE memorandum included a "draft" deployment plan and a schedule, which placed SPD and therefore the Albuquerque District in Phase I of RMS-W deployment. At the time the draft plan was issued, the Albuquerque District was in the process of awarding eight separate construction contracts totaling $100 million dollars for the German Air Force Phase II Training Facilities. The District decided to aggressively implement RMS-Windows to support this complex construction program at Holloman AFB.

At a meeting held on 26 October 1998, the District met with representatives of the TCX to discuss the implementation status of RMS-W and develop a detailed implementation plan for the District. It was decided to focus on implementing RMS-W first at Holloman and wait until this office was successfully using RMS-W before starting implementation at the other field offices. A key question that has to be decided with RMS-W is where to locate the server(s). Since T-1 lines were not available between The District and area office, the decision was made to install the server at the area office where the majority of people using the system were located. A server and new PC's were bought and installed in the area office. 56k bps lines were hooked-up between the area and three project offices (a 56k line was already in use between the District and area office.) The RMS TCX personnel came to Holloman AFB in late January and installed the RMS and Oracle software and gave training for using RMS-Windows.

IMPLEMENTATION OF RMS-W AT HOLLOMAN AFB (CONTINUED)

Since many of the personnel at Holloman were familiar with the DOS version of RMS, converting to using the Windows version was not anticipated to be a big problem.

Unfortunately there was no way to transfer financial data that had been collected for five months in the DOS version of RMS directly to RMS-Windows. All modifications and pay estimate data had to be reloaded item by item for each contract. Even after loading this information, numerous problems were soon encountered. It was impractical to use the system between the project and area offices for anything that involved the transfer of financial data due to the amount of time it took to send or receive information over the 56k bps lines. Many software problems were encountered in attempting to use the program for modifications. Also the basic construction manager's report that had been widely used in AMPRS had not yet been developed, nor was the contractor module ready for use. For the next few months Sean Moore of the Holloman office worked directly with the RMS TCX programmers to troubleshoot various software problems.

At this time (mid May 1999) many of the problems seem to have been resolved and the District is committed to using RMS-W for the remainder of the German Air Force Phase II Program. However, the District has the following recommendations to offer. To be useful for the transfer of any type of financial information from the location of the server to other offices, it has been our experience that anything less than a T-1 communication link will be totally inadequate. We are now changing the 56K hook-ups between the area and project offices and the District office to T-1 lines. In our experience non-financial information, such as daily QA reports and submittal registers can be transferred over 56K lines. A decision needs to be made in the initial planning of the RMS architecture exactly what level of data transfer is needed at each office. Once the data transfer requirements are determined, appropriate communication lines can be installed or existing lines utilized depending on the required level of data transfer.

In hindsight, the Albuquerque District may have been too aggressive in its initial application of RMS-W. We would recommend starting slowly with RMS-W and only switching over to full District implementation after the system has been used successfully on 1 or 2 contracts. Since financial data has to be reloaded manually it is impractical to switch over projects that are more than half complete or have a large amount of pay estimate and financial data that has to be reloaded.

POC: BILL MCCOLLAM, CESPA-EC-C, 505-342-3445

Return to Index of Articles

POWER QUALITY AND HARMONICS

Harmonics are generated by modern Electric equipment due to the switching characteristic of the devices. They are current and voltage waves at multiples of fundamental frequency. The harmonic waves behave the same as the fundamental frequency. However, due to higher frequency makes them more interactive with all wiring systems and reactive loads. They have greater effect per Ampere with inductors and greater effect per voltage with Capacitors. The main effect of harmonics involves unwanted heat production in electrical distribution systems and components. Harmonic currents and voltages generated by non-linear loads in the distribution systems is a form of a power quality problem. The trouble caused by the harmonics, sometimes, is minor and can be neglected. In other cases, harmonics could cause a major failure of much equipment throughout the distribution systems. This article discusses the harmonic classifications (zero, positive, and negative sequences), the effect of harmonics on transformers, and recommended design considerations.

SEQUENCE OF HARMONICS:
The non- linear loads deform the source sinusoidal waveform, thereby resulting in the flow of harmonic currents in the power system. Those harmonics (multiple of fundamental) are grouped into three groups based on their harmonic orders. The three groups are zero, negative, and positive sequences. Each group is characterized by its phase sequence. The phase sequence of these harmonics is very important because it determines the effect of harmonics on the operation of electrical equipment and wiring systems.

ZERO SEQUENCE HARMONICS:
The zero sequence group consists of 3rd, 9th, 15th, 21st, ...etc. harmonics. Each zero sequence harmonic (say 3rd harmonic) consist of three phasors equal in magnitude and having zero phase angle from each other, i.e., three vectors in phase (same direction) and equal in magnitude. Those three vectors are combined on the neutral of an electrical system. The result is an amplitude that is triple anyone phasor. The zero sequence harmonics are called “triplen harmonics typically generated by phase to neutral non- linear loads, such as computers and electronic equipment.

NEGATIVE SEQUENCE HARMONICS:
The negative sequence group consists of 5th, 11th, 17th, 23rd, etc. harmonics. Each negative sequence harmonic (say 5th harmonic) consists of three phasors equal in magnitude and separated by 120 phase degrees. They have a phase sequence opposite to the normal 60 Hz (fundamental) phasors. In any balanced three phase systems, the vectorial sum of the balanced three phases is zero and no amplitude will be combined on the neutral of an electrical system.

POSITIVE SEQUENCE HARMONICS:
The positive sequence group consists of 7th, 13th, 19th, 25th, etc. harmonics. Each positive sequence harmonic (say 7th harmonic) consists of three phasors equal in magnitude separated from each other by 120 degrees phase angle. However, they have the same phase sequence as the 60 Hz (fundamental) phasors. Also, the vectorial sum of the balanced three phases is zero and no amplitude will be combined on the neutral of an electrical system. That applies to the fundamental and all positive sequence harmonics.

EFFECT OF HARMONICS ON TRANSFORMERS:
Due to the nature of transformer construction and components (laminations, wires, coils, etc.), both current and voltage harmonics affect the operating temperature of the transformer. The current harmonics cause an increase in copper losses and stray flux losses. The voltage harmonics cause an increase in iron losses. The overall effect is an increase in the transformer heating. As a result, the life expectancy of the transformer is greatly reduced. There are many ways to avoid reducing the transformer life expectancy. One way is to use K- factor transformers, (special transformers capable to supply nonsinusoidal load currents of known characteristics, without loss of normal life expectancy). Another way is to derate the transformer capacity. There is more than one method to derate the transformers. If the total nonlinear loads are connected to phase to neutral, then the most common method of calculating the proper transformer derating is as follows:

1- KVA(derated) = KVA(nameplate) • THDF
where: THDF is Transformer Harmonic Derating Factor

KVA(derated) is the derated transformer rating feeding phase to neutral loads with harmonics present

KVA(nameplate) is the full load rating

2- THDF can be calculated as following:

THDF = 1.414 I(rms) / I(peak)

I(rms) is the true RMS phase current

I(peak) is the instantaneous peak phase current

Note: if the phase currents are not balanced, then the I(rms) and I(peak) used in the above equation is the average of the three phase readings.

Typical value of THDF is between 0.5 and 1.0. If the load is pure sinusoidal (linear), i.e. no harmonics, then THDF will be equal to one. In this case, there is no need to derating the transformer. The value of THDF will be less than one relative to harmonics generated due to nonlinear loads.

As an example; one can determine the derating factor for a transformer "THDF" feeding a load where the true rms current measurements for three phase conductors are : 320, 350, 345 Amps. And the peak phase current measurements are : 600, 680, 660 Amps respectively.

Step 1, calculate the average rms current I(rms) = (320+350+345)/3 = 338 Amps

Step 2, calculate the average peak current I(peak) = (600+680+660)/ 3= 647 Amps

Step 3, calculate THDF = 1.414 . (338)/(647) = .738

Step 4, calculate KVA(derated) = .738 KVA(nameplate)

It is clear from the above that the transformer KVA(nameplate) should be derated by a factor close to 74% in order to maintain a reasonable transformer life expectancy.

The above is a typical example in the field for transformers in the range of 200- 300 KVA, 480 volts feeding nonlinear loads. The connected nonlinear load, in this case, does not exceed 50% of the transformer total connected loads.

If the nonlinear connected loads exceed 50% of total connected loads, then THDF will be less and derating transformers is not cost effective. In such case, K-factor transformers will be more economical and should be used as follows:

- If the nonlinear connected loads is in the range 50% to 90% of the total connected loads, then K- factor (4) transformers are recommended.

POWER QUALITY AND HARMONICS (CONTINUED)

- If the nonlinear connected loads is above 90% of the total connected loads, then K- factor (13) transformers are recommended.

DESIGN CONSIDERATIONS

The industry has recognized the problem of power system harmonics in the last few years. It is obvious that the levels of harmonic voltages and currents on distribution systems are becoming a serious problem. The following recommendations should be considered in the designs when harmonics exist:

1- Delta/Wye transformers are highly recommended in the distribution systems. This type of transformers block the triplen harmonics, however, the neutral harmonic currents will circulate in the delta primary winding causing overheating and transformer failures. Derating and K-factor transformers should be considered during design phase as follows:

a- If the connected non linear load is 25% to 50% of the total connected load, then derate transformers based on ANSI/IEEE standard C57.110- 1986.

b- If the connected non-linear load is 50% to 90% of the total connected load, then use K-factor (4) transformers.

c- If the connected non-linear load is over 90% of the total connected load, use K –factor (13) transformers.

2- Neutral conductor should be oversized at least double the size of phase conductor.

3- True RMS meters should be specified.

REFERENCES

1- IEEE standard 519- 1992, recommended practices and requirements for harmonics control in electrical power systems
2- ANSI/ IEEE C57.110- 1986, IEEE recommended practice for establishing transformer capability when supplying nonsinusoidal load currents.
3- ANSI/ IEEE C57.12.00 – 1987
4- ANSI/ IEEE C57.12.80 – 1978
5- ANSI/ IEEE C57. 12.01 – 1979.
6- Electric power distribution system engineering, Turan Gonen, McGraw- Hill, Inc. 1986

POC: AL SIDHOM, CESPD-ET-E, 415-977-8116

Return to Index of Articles

MARYSVILLE/YUBA CITY SOIL-BENTONITE CUTOFF WALL

Historically, the left bank levee of the Feather River, about 7 miles downstream of Marysville, California, between River Miles 18.0 and 21.5 has experienced recurring and serious seepage problems during high river stages. In 1958, the Corps of Engineers constructed three relief wells in each of two locations where sand boils and seepage were most serious. Subsequent high river stages in 1964 proved the relief wells to be only partially effective since renewed seepage and sand boils occurred near the wells. It is believed the wells were not completely effective because of their very limited number. As a result of the 1964 experience, the Corps of Engineers constructed a 500-foot wide

landside berm approximately 2,000 feet long and 5 feet high at a location immediately downstream of Broadway Avenue. A second landside berm, 5 feet high, 200 feet wide and 1,500 feet long, exists just downstream of a local pump station. These berms were only marginally effective. While they eliminated sand boils immediately next to the levee, sand boils continued to occur beyond the berms. During high water in January 1997, a large, new sand boil developed immediately downstream of the pump station berm approximately 25 feet from the landside toe of the levee. On January 2, 1997, a levee failure occurred at River Mile 20.7. Although the cause of the failure was seepage related, the exact mechanism of the failure may never be known. In early 1997, ten soil borings were drilled to a maximum depth of 90 feet below the natural ground surface to augment the existing soil information.

The soil borings revealed that below an upper 5 to 25-foot layer of fine-grained soil blanket material, deposits of pervious sand and gravel extended 65 to 70 feet below the natural ground surface. Based on geologic logging and laboratory gradational analyses, the upper half of this deposit consists of fine to coarse-grained sand and the lower half of the deposit consists of up to 80- percent gravel. A clayey or sandy silt substratum of unknown thickness exists below the sand and gravel deposit. The combination of the deep pervious materials and the thin surface layer of fine-grained soil may be the principal cause of the past problems in this reach. The deep pervious deposits extend beyond the problem area. However, outside this problem area, the explorations show a thicker upper foundation deposit of fine-grained soil about 30 to 40 feet thick. This fine-grained blanket explains why little, if any, seepage and sand boil problems have been reported in these areas.

In the past, the most significant problem here has been foundation seepage and sand boils. Also, levee stretches within this reach consist of clean sand that are subject to seepage and potential levee instability. Any solution to the seepage problems in this reach would need to address foundation problems (i.e., uplift pressures) and address the potential for levee instability resulting from levee "through-seepage."

Combinations of most technical solutions to solve the serious foundation seepage and levee seepage problems in this reach were reviewed. Wide landside berms performed unsatisfactorily in the past and therefore were not considered an adequate fix for this area. Although relief wells can reduce foundation pressures and prevent heave and sand boils, they alone would not necessarily prevent levee through-seepage and levee instability. Because of the high variability of the foundation conditions, including the thickness of the impervious blanket, once relief wells were installed and tested during high river stages, additional wells may have been required depending on their performance. Furthermore, because of the many wells (317 for this proposed design) and pumps (16), managing the relief well system (wells, pumps and collector ditches) was a concern. If the wells were not properly maintained, or if the system was vandalized, portions of the well system could be rendered useless and the system would no longer be effective. If so, damaged wells would need replacement. There was a slight initial cost advantage to the relief well system. However, with these long-term maintenance issues and costs, a more sound engineering solution and long-term cost advantage was a waterside soil-bentonite cutoff wall with an embedded waterside geomembrane on the levee to control levee "through-seepage."

This solution was carried forward resulting in a design for a cutoff wall approximately 3 feet in width, extending to depths ranging from 66 to 73 feet and embedding about 3 feet into the impervious substratum. Work on the soil-bentonite cutoff wall began in August of 1997, beginning about six thousand feet upstream of the January 1997 levee break and ending just downstream of the break. By

using two headings, the Contractor was able to finish this work prior to the 97/98 rainy season. Final grading and hydroseeding was completed at the end of the 1998 construction period. The California Department of Water Resources lined and sandbagged the waterside slopes to minimize erosion prior to the hydroseeding. The Contractor's operation involved the use of two Koehrings. Both excavators were equipped with a 3-foot-wide skeleton bucket and capable of achieving depths of 75 feet from the constructed working surface. Slurry was hydrated and pumped from temporary landside slurry ponds. Soil-bentonite backfill was batched within the boundary of the backfilled January 1997 waterside scour hole at the breach and the material was trucked to the trench for placement. Placement of this backfill was accomplished by dumping the material directly into the lead-in trench. The backfill had a slump of between 4 and 6 inches, and was constructed to a slope of between 7 and 8 horizontal to 1 vertical. The initial backfill settled about 18 inches after 24 hours within the first 50 feet of the trench. After this, settlement measured in this reach and for the remainder of the reach was on the order of 1 to 3 inches over the minimum 14-day waiting period prior to levee restoration.

In the spring of 1998, work resumed on the remaining 9,500 feet of the cutoff wall. A new slurry wall sub-contractor was hired by the prime Contractor. Their methodology included construction of a level working platform for the entire 9,500 feet, construction of diked backfill mixing areas adjacent to the trench, and de-sanding the trench with a solid bucket to control filtrate loss. Backfill was placed with a smaller excavator following the trench excavator. A mandatory 14 day waiting period prior to levee restoration was followed as per specifications and very little settlement was measured. All construction was completed in the Fall of 1998.

The contract was set up with a performance specification requiring a permeability of less than 5 X 10-7 cm/sec and fines content ranging from 20 to 40 percent by weight for the backfill material. Even though two distinct methods of trench excavation and backfill were used, laboratory testing of the backfill material indicates that average permeabilities are less than those required and the fines content are within the specified range for the entire project. To date, the cutoff wall has not been tested because of low river stages during the 97/98 and 98/99 rainy seasons.

POC: ED FLINT, CESPK-ED-G, 916-557-7427

Return to Index of Articles

CADD / GIS

USACE GEOSPATIAL DATA & SYSTEMS VISION

As the world's premier engineering organization, the US Army Corps of Engineers has the unique opportunity to be a leader in the area of geospatial technology. From the Districts, Divisions, Labs to HQ, the organizational infrastructure and expertise are in place for the Corps to lead in the area of Geospatial technologies. The Districts use GIS technology daily executing the Corps business and supporting our military program customers. ERDAC is actively researching complex geospatial solutions in tune with industry leaders. HQ is building links with high-level information systems to enable users to visualize corporate information more easily. Geospatial technologies are used throughout the Corps and, often, geography is the common denominator linking our systems. From the top down and bottom up, the Corps is in a position to lead this technology area.

Currently, the Corps has many pockets of GIS expertise scattered throughout the organization. In order to execute our business, USACE uses everything from fully customized GIS solutions to

individuals throughout program areas performing ad-hoc analysis using an out of the box Commercial-Off-the-Shelf (COTS) product. Many of our systems (such as, ENGLINK, WCDS, and OMBIL) have incorporated a GIS component into the systems development. District offices use geospatial COTS daily to support GI planning, watershed management and habitat restoration studies. Many Districts are customizing COTS software and building databases to manage and regulate reservoir projects. In support of their missions, Navigation collects tremendous amounts of geostpatial data, hydrographic surveys, daily and Engineering collects detailed survey data for project construction. District Real Estate offices are just beginning to organize and manage our vast real estate holdings geospatially.

While the Corps is using newest versions of GIS software and often have adequate hardware, corporately we have not embraced the technology; therefore, have not realized the full potential of what the technology can do for the Corps. For the most part, data collection efforts and application development is done in conventional Corps stovepipes. We develop single purpose systems and applications, building data to support those systems. We are building applications and databases that address single issues instead of building databases to support integrated solutions. We are often using the technology to "make pretty pictures" instead of analyzing the data to support problem solving. Data collections are often executed with little thought to how it will support the entire life of a project. District offices are developing application software independently with little knowledge of neighboring Districts developing the same product. Currently, we are an organization developing applications and databases that do not fit together and are often redundant.

To reach our vision of being a leader in this technology, we need to develop a more corporate approach to geospatial technologies. We need to take full advantage of what the technology offers by embracing it throughout Corps business. We need to align geospatial application development with Corps business areas and establish Corps wide geospatial data standards so that we can share data across business areas and hierarchically throughout the organization. We need to look beyond developing project specific data sets and start developing corporate databases that support multiple applications. We need to move away from pockets of expertise scattered throughout the organization to a knowledgeable workforce using geospatial technologies to enhance daily activities. By embracing geospatial technologies corporately, it will allow the Corps to make sound decisions supported by comprehensive analysis taking into account more facets of the environment. We want to perform analysis not only using in-house data that we have collected, but also using existing data from other Federal agencies, state and local municipalities, etc. for an even more complete picture of the landscape.

To develop a successful corporate approach, it is vital that a coordination and communication infrastructure, where geospatial technology issues are addressed, be supported. Throughout USACE, groups and committees have been established to address GD&S issues. Each District has established a GD&S technical and oversight committees to promote interoperability throughout the District's functional areas. The Geospatial Data & Systems Advisory Group (GDAG) advises HQ on GD&S issues from the field and brings a users perspective to policy development. The HQUSACE GD&S Coordination Committee address GD&S issues from a corporate oversight perspective. This group meets twice a year to discuss how functional areas use GD&S technology and what GIS functionality needs to be added to our corporate information systems. The Research and Development (R&D) Field Review Group (FRG) provides field input to the GD&S R&D Program. FRG members are asked to provide guidance and feedback to R&D work units as Laboratory Project Investigators (PIs) progress with their work. Once a year, the FRG meets to review, prioritize work units and decide which new

work units should be funded. The USACE GD&S Manager/Coordinator is the facilitator for these groups; however, the success relies on support and involvement throughout the Corps.

External coordination and communication is also important to the Corps and fortunately there are mechanisms in place to facilitate. Many Corps District Offices are actively involved in their state and local GIS councils, developing working relationships that support our geospatial database development. These relationships often result in cutting cost through data sharing initiatives and solving mutual problems. The Tri-Service CADD/GIS Center is our link to coordinating with DOD installation managers and specific CADD/GIS vendors. Through the CAD2 contract, we have access to affordable software and maintenance from the primary GIS vendors. By being a member organization of the Federal Geographic Data Committee (FGDC), we have established communication links to other Federal agencies involved in geospatial technology as well as national organizations representing state and local communities along with vendor and academic consortiums. All of these mechanisms allow the Corps to effectively coordinate activities at all levels emphasizing our roll as a leader in geospatial technologies.

Through geospatial data standards, we enable our systems to internally and externally communicate. The Corps cannot be a leader if we develop internal standards that are not applicable to our customers and community. Therefore, we are involved in standards at many levels - from the user level, to Federal standards organizations that are linked to national and international standards bodies. The Tri-Service Spatial Data Standards (TSSDS) is a tool that allows us to feed user requirements to federal organizations and also implement federal standards in Corps GIS systems. It is an important mechanism that allows for standards to be developed and used at the same time.

While we have the coordination and communication infrastructure in place along with the expertise, barriers exist that prevent us from progressing internally as well as externally.

> Since most of our geospatial data is collected within conventional Corps stovepipes, we have issues concerning data ownership. At our Districts, many programs do not want to share data with other programs. Since program funds are often used to produce the data, programs often feel that it is their data.
>
> To often, our technical workforce does not receive the top to bottom support required to make the technology work corporately. Many of our managers lack the knowledge of GIS benefits and are unwilling to learn a new way of problem solving.
>
> Today, we have some experts in geospatial technologies… tomorrow there will be fewer. The Corps has a definite problem retaining a skilled geospatial workforce.
>
> To reach our vision we need identify how GIS can enhance our Corps mission programs. We need to identify specific GIS applications that will support Corps mission programs.
>
> Many of our business areas are ignorant of external geospatial programs and activities. The communication infrastructure is broken and it reflects poorly on the Corps to our customers.
>
> The Corps has no legislative authority to enter into cost saving geospatial-partnering activities advocated by state and local GIS consortiums.

USACE GEOSPATIAL DATA & SYSTEMS VISION (CONTINUED)

The Corps has an opportunity to lead in the area of geospatial technologies. We have the all the pieces in place - standards, contract vehicle, expertise, and sound policy. However, all the pieces need corporate support and the barriers need to be addressed to make the technology work for the Corps. Only through full corporate support, will the Corps become a leader at nationally focused geospatial activities as well as geographically focused local projects and geospatial research programs.

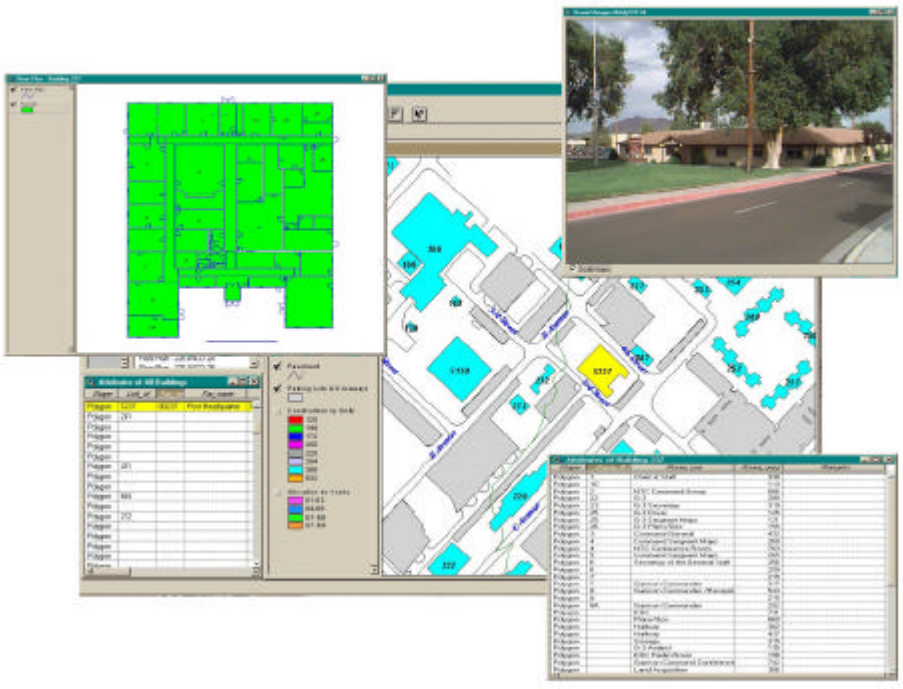
POC: NANCY BLYLER, CECW-EP, 202-761-8893

Return to Index of Articles

USE OF GEOGRAPHIC INFORMATION SYSTEMS (GIS) FOR INSTALLATION MANAGEMENT

Many Corps of Engineer Districts are utilizing GIS to varying degrees and for a multitude of applications. One particular need that many of Sacramento District's (CESPK) MILCON customers request assistance with is facility management of space and maintenance requirements on their bases and installations. Due to a decrease in the number of MILCON projects being approved, use of existing space and operation/ maintenance efforts of current assets has become paramount. The assigned missions have not decreased to match this down turn in construction, in fact some have actually increased causing bases/installations to utilize their existing assets to the maximum extent possible. GIS as a facility management tool greatly enhances the ability to track assets of all types graphically and non-graphically. GIS enables the user to make informed decisions and distribute the benefits of these decisions quickly and effectively to a wide audience.

RESULTS OF A FACILITY QUERY



The need for facility management GIS was realized due to space planning requirements and operation/maintenance tracking for existing facilities. Facility functions change based on mission needs. A facility manager may have vacant space and not realize it. A tenant may move out and not notify the manager. GIS enables the facility manager to track space and O&M projects graphically to provide quick visualization of current status of conditions. The process first involves creating detailed CAD drawings of building floor plans. These files are then converted into shape files for use in ArcView GIS. This now enables database to be easily attached to the shape files once these steps have been accomplished. ArcView GIS can now display a color-coded map that illustrates how a given area is being used. Database can be displayed in tabular

format listing such things as: SF, Room Use, Occupant, equipment, and other information that is pertinent to the user. Queries can be performed such as

> " Show me all the space occupied by this tenant." The result will be displayed graphically with database attached. Digital pictures can be linked to features in the shape files and displayed with a mouse click. Future planning scenarios can be developed for new mission needs. Information such as location of asbestos, warranty on equipment, utilities and other facility needs can be incorporated.

In response to this customer need CESPK has developed facility GIS for a variety of customers. Ft. Irwin facility GIS was developed for housing tracking. Sharpe and Tracy Defense Depots facility GIS is used for tracking warehouse storage and operation and maintenance projects. CESPK also developed a facilities GIS for Camp Doha, Kuwait to track all aspects of facility and utility usage as well as force protection buffers. Parks Reserve Forces Training Area in Dublin, California has a robust GIS that includes facilities information, environmental and natural resources and a comprehensive master plan. The master plan was developed in ArcView and in an HTML document that can be viewed at http://aafes.spk.usace.army.mil/maps2/docs/v2000/parks/emp/index.htm . Western Area Power Administration (WAPA) GIS was developed to track utility transmission and produce effective patrol maps for avoiding environmentally sensitive areas while providing maintenance crew access. California State University Monterey Bay is utilizing CESPK's GIS unit to establish a Campus GIS for facility and utility maintenance and eventually develop an ArcView based Master Plan.

The latest application for GIS has been through use of the Internet. Internet GIS software and projects are centrally loaded on a computer in a single location. Through the use of a free plug-in and a browser such as Netscape or Microsoft Explorer the end users can access the GIS project through the Internet without having to purchase GIS software for each computer. CESPK is currently developing projects for a variety of customers with this enterprise approach. An Internet GIS can be viewed by accessing the attached web page, downloading the plug-in and viewing the project. Selecting features and activating the report button will serve spreadsheets and database. Other electronic media such as HTML documents (see Parks RFTA in legend and double click on it), images, schematics and other media can be viewed. See http://aafes.spk.usace.army.mil/maps2/

POC's: TOM SOOLEWSKI, CESPK-ED-M, 916-577-7419
JIM STAPLETON, CESPK-ED-M, 916-577-7158
GERALD BOWLES, CESPK-ED-G, 916-577-5372

Return to Index of Articles

CADD TRANSLATIONS – LESSONS LEARNED

Have you ever translated a design file and discovered half the data missing, dashed lines are now continuous, or encounter fonts, colors, linestyles and line weights that are incorrect? The answer to this question is probably 'yes'. Here are some tips from lessons learned (mostly the hard way) that may be helpful in achieving a better translation. Note that no translator is 100% effective - the goal here is to minimize extensive clean up and preserve as much of the data integrity as possible.

CADD TRANSLATIONS – LESSONS LEARNED (CONTINUED)

First, before doing anything else – make sure there is adequate virtual memory. Very important! The cause for most system faults, "mdl" abort errors and incomplete translations is due to insufficient memory. The page file allocation needs to be set to at least 300 Mb; the default is typically set at 75 Mb. Increasing the allocation will also significantly improve the capability and performance of importing and referencing digital raster images. Running a defragmentation program on a regular basis is also highly recommended.

Second, verify that your data is intact. Garbage in, garbage out is definitely the case here, it is extremely important when considering round-trip translations because it is next to impossible to re-recover corrupt data to its original state. To verify MicroStation design files execute the EdG (graphics editor) program. Make sure to backup all files before running EdG! To verify AutoCAD .dwg files run the AUDIT/RECOVER command (this may take multiple attempts to fully execute).

Third, and probably most important is to learn to recognize the similarities of both CAD platforms and understand the limitations of the translator. If necessary perform a brief autopsy on the files to see how they were constructed and edit the translation tables and the dwg.bas files as appropriate. The dwg.bas is the heart of the translator, developed in BASIC, it can be found with the .tbl files (translation tables) in c:\win32app\ustation\tables\dwg\. We can solve a lot of our problems and save time by developing translation tables that are tailored to suit the requirements our major customers. One of the most common problems that exist is the fact that "some" CADD operators do not know about translation tables, where they reside, or how to modify them. Typically, most translations are done using only the default parameters that are provided – with disaster pending. It is often the case that only one CADD product is available, therefore verifying the results of translation is not possible and is stowed upon faith.

Finally, there are important questions that we need to ask in order retain as much data as possible. Quite often we receive hard copy plots that were generated with unknown plot drivers, pen tables, color, or level schemes. It is extremely difficult to match plotted output that differs from the electronic data. It would also be helpful to know the release version of AutoCAD (MicroStation), if XREFS (reference files) are being used, and are the appropriate layers frozen or thawed (levels turned on/off)? The good news is that other translators are available; such as STEP and IGES, and translation wizards are being developed to make our life a whole lot easier. The bad news remains that no matter how good the translator is - it is only as good as the person conducting the translation. The software is not perfect and neither are we - so most likely we will continue to have some difficulties. The way to minimize these difficulties is through education and experience. As a forum for discussion on translations, tri-service (A/E/C) CADD standards, and other USACE CADD issues I suggest posting them to the newsgroup at *usace.cadd*. Good Luck!

POC: RUS JARAMILLO, CESPA-EC-EH, 505-342-3468

Return to Index of Articles

FIND THE ANSWER TO ALL YOUR GIS QUESTIONS ON THE WEB

Ever wonder what is going on with GIS in the Corps? What is going on in the Geospatial R&D area? Who is the GIS point of contact for my District? Visit the Corps GIS Web page (http://gis.usace.army.mil).

Ever wonder whether data already exists over an area you are working? Visit the Corps Geospatial Data Clearinghouse (http://corpsgeo1.usace.army.mil/).

FIND THE ANSWER TO ALL YOUR GIS QUESTIONS ON THE WEB (CONTINUED)

Ever wonder if someone has already developed a GIS application that you need? Visit the CADD/GIS/FM Registry and Clearinghouse (http://www.nww.usace.army.mil/apps/tscwrc/)

Ever wonder how to ask your fellow Corps GIS users a question? Or would you like to receive email from the Corps GIS community? Check out the GIS email list at http://gis.usace.army.mil/contacts.htm.

Ever wonder what are the Tri-Service Spatial Data Standards and why are they so important to use? Visit the Tri-Service Center Web Page (http://tsc.wes.army.mil/).

Ever wonder how to purchase Intergraph and ESRI software at the best price? Visit the CAD2 contract site (http://cad2.wes.army.mil/).

POC: NANCY BLYLER, CECW-EP, 202-761-8893

Return to Index of Articles

ON THE LIGHTER SIDE...CALLING METADATA

RING! RING!

Laurel: Hello, you have reached Fort Little Mamau. This is Laurel.

Rose: Hi, Laurel, this is Rose.

Laurel: Hey, good to hear from you. What's up?

Rose: We're starting a new project, and I need a road file for Fort Little Mamau. Do you have one?

Laurel: Yes, we have one around here someplace.

Rose: Great! Tell me about it.

Laurel: Well, a contractor built it for us about 6 months ago, but we haven't really been using it. What do you want to know?

Rose: Well, how old is the road information, and where did they get it? Does it have tank tracks in it? Is one of the attributes surface type? Is it in State Plane coordinates or UTMs?

Laurel: Whoa! Slow down! It will take me a while to track down all that. I know where the contractor's report is, but I seem to remember it's not very complete.

Rose: Didn't the contractor send you the metadata with that road file?

Laurel: The meta what?

Rose: You know, the separate text file with all the background documentation about the digital road file. The metadata. All the stuff like where they got the road information and how old it is; what attributes the roads in the file have and how accurate the mapping is.

Laurel: That's all in the data report some-where, not in a separate file.

Rose: You should start keeping these metadata files for all the digital data at your installation. They are really a great help. Everything you need to know about the digital data and where it came from is listed in the metadata file so you don't have to plow through a bunch of boring reports. And you can keep all the really important data documentation together right there on your computer with the data.

Laurel: That sounds like a good idea. Last week my boss wanted to know how old the information in our vegetation cover files was and if it had been mapped from aerial photographs. That file was built before I came here, and Joe was on vacation. It took me an hour just to find the report that went with the file. Then the report was not well organized, and it took me another hour to find the date of the aerial photography used to do the mapping. It was buried in Appendix D.

Rose: That's happened to me so many times I finally got tired of it. Now we've started requiring contractors to provide metadata files when they deliver the digital data. It's so much easier to answer questions about our data. Of course, we still get the written report for the supervisors to read. But the metadata has just the import-ant stuff about the digital file itself and the data in the file. We have found that this format for documenting the data saves a lot of time and frustration. It makes it easier for us to share data, too.

Laurel: We have a lot of digital data done by about a dozen different contractors, and every report is different. Some of them are pretty good, with a lot of detail, and some of them are pretty bad. They are scattered around the building in different places, too. I hope Joe has the report that came with the road data in his office.

Rose: Metadata helps those problems, too. There is a standard list of all the things that are supposed to be documented about the data file. So it doesn't matter who collected the data or built the digital file, the metadata files all include the same information and look pretty much alike. It helps the contractors too because they know exactly what information to report about the digital data. I like having the data specs on the computer in a text file so I don't have to go looking for reports.

Laurel: OK, OK. I knew there had to be a better way. This sounds too good. What's the catch?

Rose: The catch is we are all supposed to be using metadata whether we want to or not. There was an Executive Order issued on April 13, 1994 telling all Federal agencies to document data, the metadata way.

Laurel: All right. If you can do it, I can do it. Send me a couple of metadata files so I can see what they look like, and I will look for that road file report. In the meantime, I'll go ahead and send you the road file. All we have are MicroStation design files. Can you use that?

Rose: Sure, I have to convert it to ArcInfo coverage anyway.

Laurel: What? You can do that! . . .

***ON THE LIGHTER SIDE*...CALLING METADATA (CONTINUED)**

What Laurel and Rose are talking about is the way digital geospatial data are documented. Geospatial is the fancy word for all the data in computer-aided design and drafting (CADD) and geographic information system (GIS) databases that record the location and descriptions of natural terrain and man-made features at the installation — the road file, the soil file, the vegetation file, elevation, cultural resources, endangered species, fences, fire-breaks, restricted areas, pipelines, storage tanks - plus all the database (attribute) files that go with them.

All these data are (hopefully) documented somewhere. The documentation may be in a technical report. It may be loose papers in a file folder. It may be hand-written project notes, or simply information stored in someone's memory (the file cabinet of last resort).

Everyone knows this documentation is important. It is the permanent record of where the geospatial data came from, how they were collected, how old they are, how accurate they are, and what coordinate system and datum are used. It also defines all the attributes and map codes. Only it never seems to be available when it is needed, and every set of documentation is different.

That is where metadata comes in. The metadata Rose and Laurel are talking about is simply a formal protocol for the written documentation of geospatial data. It is a standard reporting format used to organize all the documentation in data reports and file folders. Laurel can e-mail the metadata (an ASCII text file) to Rose. The metadata contains enough detail about the road file for Rose to decide if this file is really what she needs. If she does want it, then Laurel can arrange to transfer the actual road file. If not, Rose took only a few minutes of Laurel's time.

The Federal Geographic Data Committee (FGDC) has issued a standard that lists what properties of geospatial data should be documented by the corresponding metadata. This is the "Content Standard for Digital Geospatial Metadata." Most of the properties listed in this standard are things people need to know to understand and have confidence in the geospatial data they are using. Other properties listed in the standard are intended to lead the user toward the age of universal electronic data exchange (like the World Wide Web address where the data may be accessed and keywords used in on-line data searches.)

Like any big government standard, the Metadata Standard in its original published form can be intimidating. It contains many words that may be unfamiliar to the first-time user. This should not be a cause for concern, however, because several practical language translations of the standard are available. A good place to get some basic help about metadata is the FGDC Metadata home page - http://www.fgdc.gov/metadata/metadata.html. Also, the Corps of Engineers has recently released a Windows-based utility to guide the development of metadata that meets the FGDC standard. This utility, CorpsMet95, is available at http://corpsgeo1.usace.army.mil/.

Metadata has been the topic of much discussion lately, especially among installation managers, GIS practitioners, and data development contractors. As always, knowledge can combat fear. Once the user understands what metadata really is (and what it is not), it begins to sound like a good thing.

What can you do now? The most practical thing to do to get started on your metadata journey is to begin requiring FGDC-compliant metadata as a deliver-able in all contracts that have digital geospatial data as a product. At the time of data development, all the things that go in the metadata file are close

at hand, and it is a relatively minor task to generate the separate metadata file in text format. It is not a time-consuming or difficult task that will cost a lot of money.

RING! RING!
Rose: Hello, you have reached Fort Big Mamau. This is Rose.

Laurel: Hey, Rose this is Laurel.

Rose: Look, thanks for that road file. It worked out fine!

Laurel: You're welcome. Now you can return the favor. Don't you have a file showing endangered species habitat at Fort Big Mamau?

Rose: Sure do. We just received it from the contractor.

Laurel: Does it include habitat for the purple spotted blue-belly and the green stripped ladyluck?

Rose: Gee, Laurel I just load and unload data. Never heard of that stuff. Let me e-mail you the metadata, and you see if you want to use the file we have.

Laurel: OK. By the way, tell me about that Microstation to ArcInfo thing again. . . .

Well, that's another story.

POC: ROSE KRESS, CEWES-EN-C, 601-634-3665

Return to Index of Articles

TRI-SERVICE CADD/GIS TECHNOLOGY CENTER PROVIDES IMPLEMENTATION OF FGDC DATA STANDARDS

The Tri-Service CADD/GIS Technology Center (Tri-Service Center) was established in the Information Technology Laboratory (ITL), U.S. Army Engineer Waterways Experiment Station (WES), Vicksburg, Mississippi in October 1992. The Tri-Service Center's mission is to serve as a multi-service vehicle to set computer-aided design and drafting (CADD) and geographic information system (GIS) standards; coordinate CADD/GIS facilities systems within the Department of Defense (DOD); promote CADD/GIS system integration; support centralized CADD/GIS hardware and software acquisition; and provide assistance for the installation, training, operation, and maintenance of CADD and GIS systems.

TRI-SERVICE SPATIAL DATA STANDARDS DEVELOPMENT. One of the Tri-Service Center's major initiatives has been development of the Tri-Service Spatial Data Standards (TSSDS) for use in GIS implementations at Air Force, Army, and Navy installations and Army Corps of Engineers Civil Works activities. The TSSDS have been widely accepted and applied, and are a key focus of a multitude of GIS implementations throughout DOD; other federal, state, and local government organizations; public utilities; and private organizations. They are designed for use with the predominant commercially available CADD and GIS software used within the DOD (e.g., ESRI ARC/INFO & ARCVIEW, Intergraph MGE & GeoMedia, Bentley MicroStation & GeoGraphics, AutoDesk AutoCAD, World, & Map).

The most current release of the TSSDS (Release 1.8) is available for download from the World Wide Web (http://tsc.wes.army.mil) and on CD-ROM. Over five thousand CD-ROM copies of the TSSDS (of various releases) have been distributed. The CD-ROM version of the TSSDS contains an interactive Microsoft Windows application, which runs on microcomputers and workstations using a Windows 3.1, 95, or NT operating system. The application permits the user to (1) browse and review the data standards components, (2) preview and print standards documents, (3) generate SQL code schema, and (4) filter standards based on functional area.

The Tri-Service Center annually updates and expands the TSSDS data coverage. In addition, the Tri-Service Center has developed the Tri-Service Facility Management Standards (TSFMS). The TSFMS has been closely integrated with the TSSDS and is included with Release 1.8 of the TSSDS. The first focus of the TSFMS development has been environmental compliance and pollution prevention issues.

INTEGRATION OF APPROVED FGDC GEOSPATIAL DATA STANDARDS INTO THE TSSDS. Executive Order 12906, "Coordinating Data Acquisition and Access: The National Spatial Data Infrastructure" (NSDI), which was signed by the President on 11 April 1994, requires that all Federal agencies use the FGDC Metadata Standard to document new geospatial data and make them electronically accessible through the use of a National Geospatial Data Clearinghouse. Executive Order 12906 also assigned authority for the development of national geospatial data standards to the FGDC. The FGDC standards development program ensures that standards are created under an open consensus, with participation by non-federal and federal communities.

The FGDC geospatial data standards provide a "Logical Data Model" consisting of descriptive feature names (entity), attribute names, and domain names. However, this data model must be fully developed into a "Physical Data Model" before it can be implemented in a GIS. That is, all symbology (e.g., symbols, colors, fonts, line types); level/layer schemas; coverages; file table, attribute, and domain names which are compatible with commercially available GIS and relational database management systems must be developed. The TSSDS provides the "Physical Data Model" for implementation of the approved FGDC geospatial data standards in a GIS. The TSSDS has been designed to comply with the Spatial Data Transfer Standard (SDTS) data model. Provisions of the FGDC Bathymetric Geospatial Standard (International Hydrographic Standard (IHO S-57)) were incorporated into the TSSDS Release 1.6. The FGDC Vegetation, Wetlands, and Soils standards have been incorporated into the Tri-Service Center's TSSDS/TSFMS Release 1.8. In addition, two of the standards currently under development by the FGDC Facilities Working Group (Environmental Hazards Geospatial Standard and Utilities Geospatial Standard) originated from the TSSDS.

Not only does the TSSDS provide a physical database schema, it also acts as a two-way communication tool between federal standards bodies like the FGDC and user communities. The TSSDS provides the mechanism to funnel DOD user requirements to federal standards bodies while implementing approved federal standards in GIS systems. The TSSDS is an important mechanism that allows for standards to be developed and used at the same time.

POC: BOBBY CARPENTER, CEWES-ID, 601-634-4572

Return to Index of Articles

INSIDE THE APRIL 1999 CADD/GIS BULLETIN

The current issue (April 1999) of the *CADD/GIS Bulletin* summarizes the latest CADD/GIS-related activities and products available from the Tri-Service CADD/GIS Technology Center. Inside this edition, three articles focus on Tri-Service and National standards efforts. The lead article, "Tri-Service A/E/C CADD Standard Implementation Tools," reports the latest customized short cuts or utilities to facilitate the use of the National CAD Standard through the use of MicroStation-based tool, "Workspace." A companion article, "Tri-Service Spatial Data and Tri-Service Facility Management Standards - Release 1.80" summarizes the new application features and content standards developed for GIS database schemas for facilities and civil works projects. On a national level, the latest Federal Geographic Data Committee (FGDC) standards out for public review and the upcoming National GeoData Forum are listed in the "Key FGDC Activities." "Is Your CADD and/or GIS System Year 2000 Compliant?" advises a reader to check with the Installation Management/Facilities CAD2 vendors regarding your Y2K certification. Users can also learn about available CADD and GIS applications in the "ArchiCAD, a Tool for Architects," "Railer GIS as a Tool to Help Manage Railroad Track Networks," and "What are the Best Soil Erosion Models for DOD Land Managers?" articles. In support of U.S. Army maneuver engineering and operational forces, "TeleEngineering Operations" provide rapid solutions and contact information in planning and executing military operations and tactical missions. Additional newsletter announcements include the latest training courses and Center products available online. Current and back issues of the *CADD/GIS Bulletin* can be downloaded from http://tsc.wes.army.mil/headlines/bulletins/default.htm.

POC: LAUREL GORMAN, CEWES-ID, 601-634-4484

Return to Index of Articles

TRI-SERVICE CADD/GIS TECHNOLOGY CENTER PROPOSED FY00 PROJECTS

The seven Tri-Service CADD/GIS Technology Center (the Center) Field Working Groups (FWG's) met with the Field Technical Advisory Group (FTAG) in Las Vegas, Nevada 17-19 May to select the top ten projects which each group would endorse for inclusion in the Center's FY00 program. The FWG's are Design and Construction, Environmental, Civil Works, Military Planning, Facilities Management, Natural and Cultural Resources, and Systems. Members of each of these groups (except for the Civil Works Group) are from the Army, Navy, Air Force, and Corps. Forty-four new projects were submitted for consideration, with varying associated costs. Each year there are more proposed projects than funds available for the program. The FTAG and Executive Working Group (EWG) will meet in July to complete the evaluation of all proposals and determine which projects to submit to the Executive Steering Group (ESG) for approval. The projects are evaluated based on the ranking by the FWG's, the estimated ROI, the applicability of the project to all services, and the contribution of the project to achieving the goals of the Balanced Scorecard for the Center. Descriptions of the proposed projects can be viewed on the Center Web Site at http://tsc.wes.army.mil/projects/. Select, "Propose a Project," and "View Proposed Projects."

POC: JEAN MCGINN, CEMP-EE, 202-761-1052

Return to Index of Articles

Update

QUALITY MANAGEMENT PROCESS ACTION TEAM (QMPAT)

Headquarters is assembling a QMPAT chaired by Mr. Phillip O'Dell (CENWS-EC). The preliminary consensus is to combine all existing quality management (QM) regulations into one QM Engineer Regulation (ER) except for Engineer Circulars and Engineering Manuals containing technical details.

A memorandum was sent to all MSC's to solicit members to serve on the QMPAT. Senior leaders of HQUSACE have determined that QM policy development must have strong leadership from those who are dealing directly with the quality expectations of customers. The Directors of Civil Works and Military Program expected to have a representative from each MSC and one from each division within the HQUSACE Directorates of Military Programs and Civil Works on the team. The MSC PAT member could be from either the MSC or a district. The cost of all MSC representatives needs to be borne by the sponsoring MSC. It is important that the representatives be knowledgeable about the project management business process, and display a passion for at least one of the following:

"ISO" quality management standards
QM policy/guidance
quality assurance measures

The first QMPAT meeting is scheduled to be at the Pulaski Building, 20 Massachusetts Ave, Washington, DC NW, the second week of June.

POC: ROBERT PERRINE, CEMP-MP, 202-761-1260

Return to Index of Articles

PROMIS IMPLEMENTATION

PROMIS (Programs and Project Management Information System) was developed as the Corps' standard Automated Information System (AIS) to support the business processes at the district level. In the San Francisco District, PROMIS is viewed as having comparable functions to its predecessor systems such as PETS (Project Execution and Tracking System) and PRISM (Project Resource Information System for Managers), which were used for programming, budgeting, and cost analysis. The San Francisco District uses PROMIS and Open Plan Professional (the NAS program) together to assist in managing and controlling the costs and schedules of their projects.

The San Francisco District, which is a Civil Works District, began using PROMIS on a regular basis in early 1998. To assist in the initial loading and subsequent maintenance of the District's Civil Works projects, an outside contractor was brought into the District in June 1998. The District's Project Managers and Program Analysts worked with the contractor to load all of the funded projects (approximately 70 projects), including CAP (Continuing Authorities Program) projects and Operation and Maintenance (O&M) projects. By the start of FY99, the District had created "cradle-to-grave" schedules and official versions for all of their projects from the Reconnaissance Phase through the Construction Phase. (The District also developed three-year schedules for recurring O&M projects.).

To supplement the standard reports in PROMIS, the San Francisco District's Information Management Division developed custom reports using Oracle Developer 2000. Examples of the reports include Project Detail and Summary Reports showing obligations and expenditures for any given year and Organizational Detail Reports to help manage the Planning and Engineering resources. PRB (Project Review Board) reports, Project Team reports, Customer Primary Task reports, and Funding Source reports were also created to help manage the District's work.

PROMIS IMPLEMENTATION (CONTINUED)

The San Francisco District uses PROMIS, Open Plan, and the custom reports to not only manage their projects and resources, but to also comply with upward reporting requirements to HQUSACE and for the Command Management Review (CMR). During FY99, the District used PROMIS to provide the 2101 schedule to HQUSACE and the Project Level Information, Customer Primary Tasks, and Project Milestones for the CMR.

The San Francisco District is continually refining its processes and procedures with the use of PROMIS and Open Plan by working towards improvements in project reporting, cost tracking, resource leveling, and scheduling. The District is currently working on better custom reports from PROMIS, creating actual cost reports from CEFMS, and utilizing the AIS for more accurate resource leveling. These procedures will provide a standard by which the District will complete projects, and will support the District's Programs and Project Management Business Process (PMBP) as described in ER 5-1-11.

POC: JIM PARTLAN, CESPN-PM, 415-977-8719

Return to Index of Articles

CHEMICAL STORAGE EMERGENCY PREPAREDNESS PROGRAM (CSEPP) MEMORANDUM OF AGREEMENT

CSEPP is a high profile Federal Emergency Management Agency (FEMA) program that involves the protection of public facilities within a 10 miles radius from potential exposure as a result of an accident at one of the Army's eight Chemical Demilitarization sites. Public facilities include schools, nursing homes, hospitals, jails and similar facilities that would not be able to evacuate in a timely manner in the event an accident. The MOA provides for the NWO Protective Design Center to assist FEMA with the nationwide CSEPP. Work involves planning, design, analysis, training and certification of protective facilities. NWO will act as the project manager with the districts, nearest each site, performing the design and other assigned work. After some administrative delays, FEMA signed the CSEPP Memorandum of Agreement (MOA) on 20 May 1999. The two agency project managers are Bob Butrico for FEMA and Rich Heiden, NWO Protective Design Center. Carl Enson is the "recently" assigned USACE Account Executive for FEMA and this is his first MOA under this arrangement. CSEPP is one of five initiatives included in the FEMA draft customer account plan.

POC: JACK BICKLEY, CECW-EP, 202-761-8892

Return to Index of Articles

LESSONS LEARNED SYSTEM IN VICKSBURG

The new (now just fairly new) PM Regulation, ER 5-1-7, describes the Program and Project Management Business Process (PMBP). The three key elements of this process as presented in the regulation are the Project Manager, Teamwork and Customer Care. In detailing the Project Manager element, the regulation states: "The PM is responsible for optimizing corporate and customer resources and for across-the-board incorporation of lessons learned and success stories on similar initiatives. Technical members will complement this effort by incorporating lessons learned in their areas of responsibilities." Sometimes our Headquarters folks hit on real truisms (even a blind hog finds an acorn now and then). The PM necessarily has a critical role in incorporating lessons learned as do each of the technical elements in a district.

Vicksburg District has recently implemented a lessons learned system that will provide for this interplay among technical elements and PM in transferring knowledge among "similar initiatives." It

is not a system that Vicksburg developed in a vacuum. It is a culmination and evolution of efforts that began with Omaha District, was improved upon by Louisville District, further enhanced by Mobile District and now perfected (smile) by Vicksburg District. The system is not just a software package. The software is a component but not the most critical component. The complete system includes the following crucial elements:

a. Software Package – The data manipulation/access system is through the Internet. New records can be submitted for addition and existing lessons can be queried over the Internet. This makes the system easily accessible from remote offices as well as locally. It makes all the difference in the world to be able to quickly submit the information while it is fresh on your mind without having to hunt up a form, try to remember a format or keep up with whom to call. It's all done right there on your PC connected to the Internet.

b. Implementing regulation – The regulation establishes the oversight committee, details responsibilities of functional divisions, designers and oversight committee members. It describes the overall system and specific requirements of all parties.

c. Oversight committee – The committee maintains the database and shepherds the system. The committee is responsible to maintain awareness of all possible sources of lessons, review lessons submitted by individuals for appropriateness in the system, remove obsolete lessons and publicize the system. The group includes representatives from Project Management, Engineering, Construction, and Operations as well as an Information Management representative to help maintain and update the software.

d. Assured use mechanism – One little facet can make all the difference in making a system work. There is a defined checkpoint to assure that the database has been consulted on every project as the contract package is completed. Accompanying the BCOE certification is a certification by the designer that any applicable lessons (listed specifically on the certificate) have been incorporated into the package. No longer do the valuable lessons lay unnoticed in a pile of paper or a forgotten database. The database is consulted on every project. This assured use of the system further energizes submission of lessons as team members come to learn that submitted lessons are being incorporated. It's a vicious improvement circle!

e. Flexibility – Lessons can originate from any team member who touches a project. Such lessons may be applicable to any phase of the project. Construction personnel might learn lessons applicable to the design phase or construction personnel might learn lessons applicable to their own construction phase. Project Managers experience lessons applicable to planning, design, construction or anywhere in the life cycle. The Vicksburg system accounts for lessons learned by any team member applicable to any phase of the project.

For any lessons learned system to work properly, Engineering and Construction functions, in particular, must work together for the mutual benefit of our customers. Defensiveness is shed in favor of continuous improvement. Designers become hungry for positive feedback on ways to make plans and specifications increasingly better. The most common concern expressed about implementation of a lessons learned system is whether the designers will embrace the system. Will they take lessons learned as a personal affront? Certainly not. Contrary to popular belief, designers are regular human

beings – they do want to delight the customer. Designers appreciate lessons tendered in the spirit of continuous improvement and will enthusiastically adjust procedures to account for actual experience.

For more information on the Vicksburg District Lessons Learned System, visit the system through the Internet at: http://www.mvk.usace.army.mil/cis/llearned/cgi/LLEARNED.exe

POC: LEO PHILLIPS, CEMVK-CD, 601-631-5096

Return to Index of Articles

Dam Safety

ARMY INSTALLATION DAM SAFETY WORKSHOP

The 1999 Army Dam Safety Workshop was held 11-12 May 1999 in Deerfield Beach, Florida. The disaggregation of the U.S. Army Center for Public Works (CPW) at Ft. Belvoir has opened opportunities for Civil Works dam safety staff to leverage our expertise to support Army dams. This presents a win-win situation where we can obtain additional interesting work that we need to help maintain our technical expertise and core competencies. This initiative is clearly in-line with the Corps Vision, specifically supporting the Substrategies of "Serve the Army" and "Enhance Capabilities."

AR 420-70 is being revised, and will contain a chapter on dam safety. Army Installations will have specific requirements for inspection and maintenance of dams. The Corps can provide increased levels of support to accomplish these requirements and ensure the safety of Army dams. CEMP is assigning "PM Forwards" to each Division as POC's for Corps support to Installations (One Door to the Corps). In locations where these positions are unfilled, geographic Division Dam Safety Coordinators will be the POC for Installation dam safety work.

CECW-E will continue to work with our Military Programs counterparts to assist in the development and funding of a more comprehensive overall Army Dam Safety Program. Bridge safety is another opportunity for increased Corps Civil Works support, thanks to our specialized expertise.

POC: BOB BANK, CECW-EP, 202-761-1660

Return to Index of Articles

PROJECTS WITH IDENTIFIED SEEPAGE AND STATIC INSTABILITY DEFICIENCIES

Seepage and static instability deficiencies has have been identified at 13 Corps of Engineers dams. Negotiations are currently under way with the Assistant Secretary of the Army (Civil Works) to include these projects under the change in state of the art section of the Dam Safety Assurance Program. This change in Army administration would bring our policy in line with the dam safety program policy of the Bureau of Reclamation. The projects provided for consideration are as follows:

Mississinewa Dam, IN - Mississinewa Dam includes an unzoned impervious earth-filled embankment, ungated spillway, and a gated outlet works. The project was designed in the 1950's and 60's with construction completed in 1967. Much of the foundation beneath the right half of the embankment consists of very deep, variably pervious glacial till deposits. The embankment is about 8,100 feet long, is about 140 feet high at maximum section and has no cutoff through the pervious foundation reach. Reservoir water passes under the dam through pervious foundation and emerges as uncontrolled seepage at the downstream toe. Uncontrolled seepage and piping have occurred with relatively low reservoir pool levels. Localized settlement and subsidence has been observed possibly

related to the ongoing seepage and piping. Potential corrective action likely required would be a fully penetrating cutoff wall constructed through the dam and the underlying pervious foundation. (Potential DSAP project.)

West Hill Dam, MA - West Hill Dam includes an earth-filled embankment, ungated spillway, and a gated outlet works. The project was designed in the 1950's with construction completed in 1961. Most of the foundation beneath the embankment consists of deep (>90 feet), pervious glacial sands and gravels. The embankment is about 2,000 feet long, is 51 feet high at maximum section and has no cutoff through the pervious foundation alluvium. Reservoir water passes under the dam through pervious foundation and emerges as uncontrolled seepage at the downstream toe. Uncontrolled seepage and piping, manifested as sand boils, have occurred with as little as 15 feet of reservoir pool requiring severe operating restrictions. Potential corrective action likely required would be a fully penetrating cutoff wall constructed through the dam and the underlying pervious foundation. (Potential DSAP project.)

Westville Dam, MA - Westville Dam includes a zoned, rolled earth and rock-filled embankment, ungated spillway, and a gated outlet works. The project was designed in the 1950's with construction completed in 1962. The foundation beneath much of the embankment consists of pervious alluvial and glacial till sands and gravels overlying fractured bedrock. The embankment is about 560 feet long, is 78 feet high at maximum section and has a cutoff through the pervious foundation alluvium and till into the fractured rock. Reservoir water passes under the dam beneath the cutoff trench through the fractured rock foundation and emerges as uncontrolled seepage at the downstream toe. Uncontrolled seepage with active sand boils/piping has been observed during flood events. The record pool for this project is only about 56% of flood control pool. Potential remedial corrective action likely required would consist of a relief well and seepage collector system along the embankment toe into the underlying pervious foundation. (Probable O&M project.)

Center Hill Dam, TN - Center Hill Dam includes a concrete gravity dam with integral powerhouse and spillway flanked with an earth-filled embankment. The project was designed in the 1940's with construction completed in 1952. The concrete section is about 1,390 feet long. The embankment is 778 feet long and 226 feet high at maximum section. Much of the foundation beneath the embankment consists of a hard, generally competent yet solutioned limestone formation. Reservoir water passes under the dam through the solutioned cavities and open caverns and emerges as uncontrolled muddy seepage downstream from the embankment indicative of piping of clays from solution channels and possibly overlying foundation soils. Severity and volume of uncontrolled seepage is directly related to pool level and duration. Potential corrective action likely required would be a fully penetrating cutoff wall constructed through the embankment dam and the underlying solutioned limestone foundation. (Potential DSAP project.)

O.C. Fisher Dam, TX - O.C. Fisher Dam includes an earth-filled embankment, ungated spillway, and a gated outlet works. The project was designed in the 1940's with construction completed in 1952. The embankment is about 40,900 feet long and 128 feet high at maximum section. Much of the foundation beneath the embankment consists of a very hard, yet porous conglomerate. Reservoir water passes under the dam through the conglomerate and emerges as uncontrolled seepage downstream from the toe into a residential area adjacent to the downstream toe. Severity and volume of uncontrolled seepage is directly related to pool level and duration. Potential corrective action likely

required would be a fully penetrating cutoff wall constructed through the dam and the underlying pervious foundation. (Potential DSAP project.)

Mill Creek Dam, WA - Mill Creek Dam includes an earth-filled embankment and outlet works. The project was designed in the 1930's with construction completed in 1941. The embankment is about 3,200 feet long and 125 feet high at maximum section. The embankment itself consists of compacted but erosion prone silts. Much of the foundation beneath the embankment consists of a piping susceptible silts overlying weakly cemented, very porous, open work gravel and cobble conglomerate. Reservoir water passes under the dam through the pervious foundation conglomerate and emerges as uncontrolled seepage at the downstream toe. Sinkholes in the exposed foundation and embankment were observed during early project operations following pool excursions of only a few feet. Severity and volume of uncontrolled seepage is directly related to pool level and duration. Earlier remedial work included a limited cutoff wall through the dam, which terminated short of the abutments to alleviate piping potential within the embankment itself. Potential corrective action likely required would be a fully penetrating cutoff wall constructed through the dam and the underlying pervious foundation into the abutments. (Potential DSAP project.)

Moose Creek Dam, AK - Moose Creek Dam includes a zoned earth-filled embankment, ungated spillway and gated control works and dike. The project was designed in the 1970's with construction completed in 1981. The embankment consists of semi-pervious silty gravel upstream 'core', free-draining gravel downstream shell and an 'impervious' upstream seepage blanket. Most of the foundation beneath the embankment consists of very deep (>600 feet), pervious alluvial sands and gravels. The embankment is about 40,200 feet long, is 50 feet high at maximum section and has no cutoff through the pervious foundation alluvium. Reservoir water passes under the dam through pervious foundation, creates high uplift pressures in the area of the downstream toe and emerges as uncontrolled seepage at the downstream toe. Sinkholes have been observed in the upstream blanket due to piping of the blanket soils into the pervious foundation and will be repaired as these develop under ongoing maintenance in the O&M program. Potential corrective action likely required to address seepage emergence and uplift near the downstream toe would be a system of deep, though only partially penetrating relief wells. (Potential DSAP project.)

John Day Dam, OR - John Day Project Lock & Dam includes a concrete gravity dam with integral powerhouse, gated spillway, and navigation lock flanked with an earth-filled embankment. Construction was completed in 1970s. The foundation beneath the powerhouse consists of a hard, generally competent yet fractured volcanic rock. High uplift pressures and large volumes of seepage have been observed in the foundation beneath the powerhouse. Severity and volume of uncontrolled seepage is directly related to pool level and duration. Potential corrective action required would be include a system of drains and relief wells with collector system into the fractured rock beneath the powerhouse. (Probable O&M project.)

Whittier Narrows Dam, CA - Whittier Narrows Dam includes an earth-filled embankment, gated spillway, and a gated outlet works. The project was designed in the 1940s and 50's with construction completed in the early 1960s. The embankment is about 16,900 feet long and about 56 feet high at maximum section. Much of the foundation beneath the embankment consists of pervious sands and gravel to significant depths. Reservoir water passes under the dam through pervious foundation and emerges as uncontrolled seepage at the downstream toe. Uncontrolled seepage and piping, manifested as sand boils, have been observed during flood related pool excursions. Severity and volume of

PROJECTS WITH IDENTIFIED SEEPAGE AND STATIC INSTABILITY DEFICIENCIES (CONTINUED)
uncontrolled seepage is directly related to pool level and duration. Potential corrective action likely required would include an extensive relief well and drainage collector system. (Probable O&M project.)

Herbert Hoover Dike, FL - Herbert Hoover Dike is an earthen embankment system extending along the perimeter of Lake Okeechobee for a distance totaling in excess of 140 miles with a maximum height of about 25 feet. Built over many different problem foundation types and to pre-modern standards of design and construction, seepage and piping are widespread. The remediation likely will consist of a combination of berms and cutoff wall systems designed for each specific problem reach. (Presently Major Rehab though potential DSAP project.)

Ball Mountain Dam, VT - Ball Mountain Dam includes an earth and rock-filled embankment, ungated spillway and a gated tunnel outlet works. The project was designed in the 1950's with construction completed in 1961. The embankment is about 915 feet long and 265 feet high at maximum section. The embankment and internal zoning interface slopes are very steep. A slide, believed to be entirely contained in the embankment, exists over much of the downstream portion of the dam. The slide scarp extends into the embankment crest with surface expression consisting of subsidence along the downstream half over much of the crest length. Movement appears related to pool level and duration. Potential corrective action is likely to be a downstream berm to reduce the over-steepened downstream slope. (Potential DSAP project.)

Oahe Dam, SD - Oahe Dam includes an earth-filled embankment, gated spillway, powerhouse and a gated outlet works. The project was designed in the 1940s and 50's with construction completed in 1966. The embankment is about 12,000 feet long and 245 feet high at maximum section. A portion of the embankment near the right abutment is constructed over very weak, pre-sheared foundation material. A slide extending through the foundation and embankment extends for about 1000 feet along the dam in this area. Movement appears related to pool level and duration. Potential corrective action likely required would be a downstream berm to serve as a buttress to resist the embankment thrust due to elevated pool levels. (Potential DSAP project.)

Libby Dam, MT - Libby dam is a concrete gravity dam. It has an active large slide in the rock abutment above the dam on the extreme left abutment, which has potential to endanger the dam, and related facilities. Likely remediation would consist of excavation of the slide mass and flattening of the left abutment slope. (Probable O&M project.)

POC: ARTHUR WALZ, CECW-EG, 202-761-8681

Return to Index of Articles

FISCAL YEAR 2001 BUDGET GUIDANCE

On 7 May 1999, Dr. Westphal, Assistant Secretary of the Army (Civil Works), issued his budget guidance for Fiscal Year 2001 in a letter to LTG Ballard. The guidance contains some items that effect the Dam Safety Assurance Program and backlog maintenance. The letter requires that the Corps of Engineers made a cost sharing analysis on the projects that are proposed for seepage modifications under the Dam Safety Assurance Program. Specifically, the cost sharing under the Dam Safety Assurance Program is to be compared to cost sharing under the Major Rehabilitation Program. The results of the analysis are to be forwarded to CECW-EP not later than 28 June 1999.

FISCAL YEAR 2001 BUDGET GUIDANCE (CONTINUED)

The second item of concern to Engineering personnel is the paragraph on Federal Investment in Capital Infrastructure. Engineering must work closely with Operations and PPMD personnel to insure that the backlog includes seismic and other studies related to dam safety and all other items that relation to dam safety (such as piezometers, instrumentation, etc.). This is an opportunity to influence the backlog issue.

For us to compete for Construction funding in the future we need to insure that known Dam Safety Assurance Program work and known Major Rehabilitation work related to dam safety is included in the PRISM (PROMISE) 10-year program database. For the purpose of out-year estimates, assume that in the next 10 years that we will receive sufficient O&M funds to complete all DSAP studies and start construction on all known DSAP projects.

In addition, projects being proposed for probable design or construction deficiencies as defined in ER 1165-2-119, as amended by DAEN-CWR-R memorandum, 13 February 1987, subject: Cost Sharing for Correction of Design or Construction Deficiencies, should be included in the 10-year program.

POC: CHARLES PEARRE, CECW-EP, 202-761-4531

Return to Index of Articles

BIENNIAL REPORT TO CONGRESS TO DAM SAFETY

The Director of the Federal Emergency Management Agency (FEMA), James Lee Witt, will report to the President and the Congress on the status of the National Dam Safety Program for fiscal years 1998 and 1999, as required by Public Law 104-303. The report includes an assessment of the progress of the federal agencies in implementing the Federal Guidelines for Dam Safety (the Guidelines). The Corps of Engineers will report on the status of our agency's policies, standards, and procedures plus, the status of the dam safety program for Army, Navy, and Air Force installations.

The National Dam Safety Program was statutorily established by the 1996 Water Resources Development Act and signed into law by the President on October 12, 1996. The purpose of the Program is to reduce the risks to life and property from dam failure in the United States. A major emphasis in this year's report will be to describe for the President, the Congress, and all stakeholders the scope of national dam safety in terms of the resources and mechanisms being used to mitigate the risk from dam failure.

The MSC Dam Safety Coordinators have been asked to complete their input to the biennial report using the format that was provided by FEMA and to submit it to CECW-EP not later than 15 July 1999. The Civil Works input and the Military installation input will be consolidated into a single Department of Defense report and submitted to FEMA by 30 July 1999.

POC: CHARLES PEARRE, CECW-EP, 202-761-4531

Return to Index of Articles

NEW DAMS LISTED IN THE NATIONAL INVENTORY OF DAMS

Work is almost complete on the updated of the National Inventory of Dams (NID). The new inventory has 80,005 dams listed. Personnel at the Topographic Engineering Laboratory worked closely with the various State and Federal agencies to complete this inventory. The 1995-1996 revision of the

NEW DAMS LISTED IN THE NATIONAL INVENTORY OF DAMS (CONTINUED)
inventory listed only 75,187 dams. The 50 states added 3,410 new dams to the inventory. These included newly constructed dams and dams not included in previous inventories. The Federal agencies added 489 dams to the inventory, mainly privately owned-Federally regulated dams.

The NID is available on the Internet at ***HTTP://WWW.TEC.USACE.MIL***. After accepting the security statement, click on "Programs and Products" on the next screen. Choose "National Inventory of Dams" from the programs and products list and you are at the inventory where you can query information using any of the menus.

POC: REBECCA RAGON, CETEC-TSD, 703-428-6766 EXT. 2476

Return to Index of Articles

Technical

SOUTH PACIFIC DIVISION TECHNICAL SPECIALIST PROGRAM

The Engineer and Scientist Career Program Planning Board, in May 1997, directed that a strong career ladder for technical disciplines is essential to maintaining core competencies in the Division mission areas. With Districts being fully responsible for technical adequacy of products, the establishment of enhanced non-supervisory technical specialists/expert positions at the District level was imperative. A Division-wide Advisory Panel for establishment of Technical Specialist position was established. The panel members were and continue to be: Brian Doyle (CESPK-ED), Robert Koplin (CESPL-PD), Thomas Kendall (CESPN-PE), Robert Meehan (CESPA-EC), John Bogue, (CESPD-ET-P) and Jack Farless (CESPD-ET-E). A review process was established:

1. District Staff Chief envisions the need for a Technical Specialist Position and provides a brief explanation of the duties and need for the position to the Advisory Panel. The panel will evaluate whether the requested position complements Division wide capabilities or duplicates an existing position, if there is sufficient potential workload Division-wide to support the position and if the position seems likely to meet various classification criteria for non-supervisory GS-13 positions. The Advisory Panel's informal evaluation will be provided to the initiator.

2. If the position favorable meets the criteria, the staff chief will then proceed with classification of the position. Once the position is classified, the job description is provided to the Advisory Panel for review and formal concurrence or non-concurrence by Director, Engineering and Technical Services. If concurrence is obtained, HR will initiate recruitment action. The following checklist is used for this stage with all 6 items requiring an answer of Yes:

    a) Is this the District's Senior Technical position for this specialty?

    b) Will the incumbent be the final approval authority on technical matters in the specialty area?

    c) Are the duties regional in scope, serving the Districts in the Division?

    d) Is there sufficient volume and duration of specialized workload to support this position?

SOUTH PACIFIC DIVISION TECHNICAL SPECIALIST PROGRAM (CONTINUED)

e) Does the position avoid overlapping duties with other existing or planned Technical Expert/Specialist positions in any of the SPD Districts? (EXCEPTION: In order to comply with independent technical review requirements, and reduction of regional expertise more than one technical expert may be required in each discipline.)

f) Does the Job Description appear to accurately reflect expected types of work and duties, and does the Evaluation support the grade of the position.

3. An appeals process is also established for non-concurrences if the Staff Chief so desires.

The Advisory Panel has identified approximately 40 potential technical specialist positions and placed them in priority levels 1-3. To date the Advisory Panel has concurred with 15 technical specialist positions and 12 are currently filled. See http://www.spd.usace.army.mil/ for the SPD Home Page and then click on the SPD Technical Specialist icon.

In summary, the Technical Specialist Positions are Regional in nature, describing the workload of the home district as well as the workload of the entire Division. The job description has as a major duty a minimum of 30% as a SPD expert for the entire Division Program, i.e., independent review team members, trouble shoot for other Districts, represents DETS or the Division Commander at meetings/conferences and so forth. The other 70% are directed specifically at the home district technical requirements. When one of the Technical Specialists is performing work at the request of the South Pacific Commander or for DETS, the salary and travel costs will be covered as an ED&M functional cost.

POC: JACK FARLESS, CESPD-ET-E, 415-977-8126

Return to Index of Articles

NEW ENGINEER MANUAL EM 1110-2-1424 ON LUBRICANTS AND HYDRAULIC FLUIDS

One of the Folsom Dam tainter gates failed in 1995. Corrosion occurred over time at the steel trunnion pins and caused an increase in the friction force at the trunnion. The friction-induced load at the strut brace exceeded the bolt capacity. The bolts sheared and resulted in the buckling of struts. Lubricant's primary function is to reduce friction between two moving surfaces. However, it also, in many instances, serves as a protection against rust and corrosion, a heat-transfer medium, a sealing medium, or a scavenger for contaminants. Mechanical or structural failures often occur without proper selection and application of the lubricant. Stuck chain caused a gate to drop and failed at the Red Rock Dam was another example of not having the proper lubrication. This new engineer manual was co-written with the Bureau of Reclamation. It covers a variety of topics including lubricating oils, hydraulic fluids, greases, environmentally acceptable lubricants, additives, civil work applications such as turbines, pumps, and gear drives, and operation and maintenance considerations. The manual also contains a survey result on various lubricants currently used on the Corps civil works projects. Under the high performance materials and systems (HPM&S) Research and Development program, a work unit on environmentally acceptable (EA) lubricants is being funded for the purpose of evaluating available EA fluids in the marketplace and providing guidance on their expanded use. We would like to learn more about your lubrication-related problems. Please leave me a voice or E-mail message. (Andy Wu, CECW-ET, 202-761-8614, andy.a.wu@usace.army.mil)

POC: ANDY WU, CECW-ET, 202-761-8614

Return to Index of Articles

Information

FFM VIEWERS SUITE

We received some information last month of a group of programs for viewing engineering drawings that the various districts might want to preview. The FFM Viewers Suite is a comprehensive line of solutions that directly address the problem of sharing technical drawings and schematics in an intranet/web environment.

Entirely written in Java, the Viewers Suite, enables the display of vector graphics (HPGL, CGM) and raster images (CALS Raster Group 4 and Tiff), embedded in traditional Web pages.

The product comes in the form of an Applet that reads and displays CALS files in any Java enabled browser. The product doesn't need to be set up on every user's hard drive, it is automatically downloaded from the server to any client computer and starts working instantly no matter what platform and operating system.

The company also offers an API that allows you to create stand-alone applications for use with electronic documents. The API comes with a sample application, demonstrating features such as importing, displaying, printing and managing CALS files.

A demonstration of the software (not the original Java applet, but a close simulation) is downloadable from the Netpulser web page at http://www.netpulser.com

POC: CHARLIE BALDI, CECW-EP, 202-761-8894

Return to Index of Articles

BUSINESS PLAN FOR MAINTAINING ENGINEERING EXCELLENCE WITHIN USACE WORKFORCE

Don Dressler and Terry Houghton were tasked to up a task team of HQUSACE, MSC, Laboratory, and District individuals to develop a business plan for maintaining engineering expertise in USACE. The task also included preparing a briefing on workforce excellence that the Chief of Engineers would use in his presentation portfolio. A holistic excellence program is being developed that will lead to growth and maintenance of our workforce expertise. This initiative is intended to do more than merely connect the individual parts listed below. Original thought and deliberation are the key to this effort. The course is not known, as it may lead us to decide that some of efforts are no longer worth supporting and may identify something better to do in their place.

Some of you on the team were present during the last "Kitchen Cabinet" session held at HQUSACE and heard Don's briefing on Engineering Excellence. This current effort and tasking is a spin-off of that presentation. Both Carl Enson and Dwight Beranek would like to provide the Chief with a similar briefing. This is a great opportunity to put together an integrated approach for maintaining engineering excellence in the Corps. The following questions are being be addressed for each of the subjects below:

BUSINESS PLAN FOR MAINTAINING ENGINEERING EXCELLENCE WITHIN USACE WORKFORCE (CONTINUED)

Where are we now?

Are we following the Chief's vision?

How do we get there?

The subject areas are:

1. Maintaining viable workforce expertise - What kind and size of workforce does it takes for Corps to accomplish its intended mission. Include on-the-job-training, formal training and mentoring.

2. Consolidation / Regionalization - Should the Corps consolidate / regionalize its engineering workforce - Pros and Cons.

3. Private Sector Contracting - Not competing with private industry - Optimal percentage of contracting out engineering work - Pros and Cons

4. LAB's Role in supporting the districts - What are the Lab's capabilities beyond R&D, which can be better used by USACE.

5. MCX's Role in supporting the districts - What are the MCX's roles - How can the Corps better utilize the MCX's - Must the Corps maintain MCXs - Pros and Cons.

6. ROC's Role in supporting the districts - What are the ROC's roles - How can the Corps utilize the ROC's - Consulting/Design/Review services - Pros and Cons.

7. Plan Formulation - What expertise is needed to: frame problems; create alternatives; evaluate outputs and impacts; rationale for selection.

8. Role of Operations.

9. Partnering/Alliance with Industry/Professional Societies.

10. Positions requiring professional registration.

The following individuals were recommended for the task force team. At the initial meeting of the team each individual providing the group a presentation on his/her task. These presentations were given to the group with the understanding that there will be open discussion during and after each presentation so that we can formulate a comprehensive business plan and an overall briefing to Directors of Civil Works and Military Programs and eventually to the Chief of Engineers.

BUSINESS PLAN FOR MAINTAINING ENGINEERING EXCELLENCE WITHIN USACE WORKFORCE (CONTINUED)

Tasking	**Individual in charge of briefing**
Maintaining Viable Expertise,	Ed Middleton, CESAJ-EN & Phil O'Dell, CENWS-EC
Consolidation / Regionalization	Paul Robinson, CELRD-ET
Private Sector Contracting	Ron Hatwell, CEMP-EE & Charles Pearre, CECW-EP
LAB's Role	Dr. Radhakrishnan, CEWES-IV-Z & Tom Hart CERD-M
MCX's Role	Robert Bank, CECW-EP & Ray Navidi, CEMP-ET
ROC's Role	Ray Navidi, CEMP-ET
Plan Formulation	Harry Kitch, CECW-D
Operations.	Jim Wolcott, CECW-OA
Partnering/Alliance with Industry /Professional Societies	Larry Delaney, CEMP-E
Positions requiring Prof. registration	Joe Hartman, CECW-ET

The first meeting of the team was held on 27 and 28 May 1999. A copy of the plan that is developed will be furnished to all Districts and MSC's.

POC: DONALD DRESSLER, CECW-ET, 202-761-0220

Return to Index of Articles

NEW STANDARD CHARGING OF INDIRECT COSTS

A new policy for Standard Charging of Indirect Costs has been adopted. The policy has been coordinated and approved by all HQ staff. It is being rewritten into an Engineer Circular (EC) format, approved by the DCG, and issued during the month of June. The BOD approved the new policy change and asked that advance copies be sent out, so the MSC's can start building their operating budgets for next year based on the new policy. We have posted the policy on the Resource Management home page.

To view it, connect to http://www.usace.army.mil/inet/functions/rm/regs/regs.htm. Select "Guidance", then select "Advanced Copy of Operating Guidance for Standard Charging of Indirect Cost USACE-wide".

POC: STEVEN COAKLEY, CERM-ZA, 202-761-0077

Return to Index of Articles

GEOTECHNICAL AND MATERIALS POINTS OF CONTACT LIST PLACED ON LINE

The database of Points of Contact in the geotechnical and concrete materials areas within the Corps of Engineers is completed and placed on-line. The URL is http://www.usace.army.mil/inet/functions/cw/. Select Engineering/Geotechnical and Materials. Double click the link "Geotechnical and Materials POC list by division and district" at the end of the Branch mission statement. This list is grouped by individual office. It includes a branch/section chief and POC's in the areas of soils, geology and concrete materials. It will be updated periodically to keep the data as accurate as possible.

POC: M. K. LEE, CECW-EG, 202-761-0412

Return to Index of Articles

ARMY INSTALLATION PLANNING RECOGNIZED BY FPD AWARD

The Army was among the winners in this year's Federal Planning Division (FPD) Awards completion, announced at the FPD Workshop in Seattle, WA on 23 April 1999. The Alaska installations took first in Category 3 (Area Development Plan), with "Family Housing Community Plans-Fort Richardson and Fort Wainwright, Alaska".

As in the past, FPD solicits one of the nation's premier planning schools to evaluate and judge the entries. The University of Washington judged this year's entries. The jury commented:

The plans for these communities represent an appreciable refinement of existing techniques for helping to create family-oriented environments for military installations that fit comfortably into their larger community settings. The project is guided by a strong set of principles that have elevated the standard of comprehensive planning and design for enhancing the livability and community integrity of military housing. Also notable were participatory processes that engaged residents in planning.

The jury, which represented senior department members, also commented on the fine quality of planning overall represented by the entries.

Our congratulations to the Alaska DPW, Alaska District, Corps of Engineers and Nakata Planning Group, and thanks to all whose entries so well represented Army installation planning.

POC: RIK WIANT, CEISC-FP, 703-428-6086

Return to Index of Articles

Value Engineering

NEW CORPS CUSTOMER VIA VALUE ENGINEERING (VE)

Mississippi Valley Division and New Orleans District are to be congratulated for their efforts in providing Corps of Engineers Value Engineering services to East Baton Rouge Parish under the Planning Assistance to States Program (better known as the Section 22 Program). The Corps has proffered over $100 million in proposals on a Parish project being designed by Architect/Engineer. The Parish received a solid Corps review on a significant project while paying half the cost, and the Corps has added yet another satisfied customer through VE.

POC: MICHAEL HOLT, CEMP-EV, 202-761-8738

Return to Index of Articles

Training

NO ARTICLES

Return to Index of Articles

Meetings and Conferences

NFPA World Fire Safety Congress and Exposition

On 17-20 May 1999, Bob DiAngelo, HQUSACE/CEMP-ET, attended the National Fire Protection Association (NFPA) World Fire Safety Congress and Exposition in Baltimore, MD. This is an annual event that occurs every May. Over 250 exhibitors showed off the latest products and technology in the field of fire science and life safety. Many of the exhibitors conducted formal presentations.

In addition, many technical seminars were presented. One seminar addressed new smoke detector technology that is under development. By combining smoke measurement with carbon monoxide measurements, future smoke detectors will become more sensitive and, at the same time, less prone to false alarming. In the past, smoke detectors had a major false alarming problem. One way that the industry reduced false alarming was to reduce the sensitivity of smoke detectors. This new technology will significantly improve smoke detector performance and reliability. Another seminar addressed the potential problem with microbiologically influenced corrosion (MIC) in sprinkler systems. The MIC problem in sprinkler systems has been increasing in recent years. One theory for the increase is lower chlorine concentrations in our water supplies. In systems that are prone to MIC, it was recommended that water entering the sprinkler system be treated with a suitable biocide. Topics of other technical seminars included water mist fire suppression systems, integrating fire alarm systems with building systems, new sprinkler technology for protection of high rack storage, photoelectric versus ionization smoke detectors for residential occupancies, and the new Article 695, Power Supplies for Fire Pumps, NFPA 70, National Electric Code.

Numerous new editions of the NFPA standards and codes were voted on at the meeting. Many of the proposed changes generated considerable floor debate and controversy, which are typical for consensus-approved standards and codes. This event provided effective technical training and updating for engineers responsible for fire protection and life safety.

POC: ROBERT DIANGELO, 202-761-4803

Return to Index of Articles

Partnering

DAM SAFETY PARTNERING WITH STATE OF CALIFORNIA AND LOCAL SPONSORS (TRIAD)

The Water Resources Development Act of 1986 requires a local sponsor, cost sharing by the local sponsor and turn over of completed works to the local sponsor for all projects, including dams that in the past had traditionally been Operated and Maintained by the Corps. Since these projects would now eventually be owned by a non-federal entity, this, in effect, gave states the right to participate in the design and construction of Corps dam projects since otherwise they would not be in a position to issue the necessary operating permits to the local sponsor.

DAM SAFETY PARTNERING WITH STATE OF CALIFORNIA AND LOCAL SPONSORS (TRIAD) (CONTINUED)

This was a major change from the past when federally constructed dam projects were essentially exempt from state and local regulation. This presented a challenge to the various States and to the Corps as there was no precedent or established procedure for state involvement. The State of California was a particular challenge, for they have, through their Division of Safety of Dams (DSOD) some of the most stringent criteria and licensing requirements. Further complicating the situation was the upcoming construction of Seven Oaks Dam, a 550-foot high embankment dam located between two strands of the San Andreas Fault.

To meet this challenge, the South Pacific Division implemented a partnering arrangement with the DSOD, with an emphasis on open communications and teamwork. The main mechanisms were regular joint meetings (Triads) and coordinated implementing regulations by both the Corps and the State of California.

Triads are so named for the three key participants: The Corps, The State and The Local Sponsor. There are two types of Triads: project specific Triads and general Triads. Project specific Triads are held for a particular project, such as Seven Oaks Dam, to discuss project specific issues. General Triads with the State of California and the local sponsors for the various projects in California are held for discussion of statewide issues and potential upcoming projects.

HQ USACE provided guidance in Policy Guidance Letter Number 39, "Responsibilities of the Corps of Engineers and Local Sponsor to Ensure Safe Operation, Maintenance, Repair, Replacement and Rehabilitation for Flood Control and Multipurpose Dams Constructed Under Provisions of PL 99-662", dated 13 November 1992.

The South Pacific Division has also implemented its regulation 1110-1-7, "Interagency Cooperation between The U.S. Army Corps of Engineers and State Dam Safety Regulatory Agencies". The State of California has implemented "DSOD Procedure 3-4 Cooperation with the U.S. Army Corps of Engineers and Certification of Corps-Built Local Projects". These regulations were jointly developed and are revised as necessary. (For a copy contact the POC below.)

For other states within the South Pacific Division the procedures are less formal (although SPD Regulation 1110-1-7 establishes procedures for cooperating with all states within the division boundary) emphasizing communication and cooperation from initial project planning through turn-over of the dam to the local sponsor and to State jurisdiction.

POC: JOE HOVELL, CESPD-ET-E, 415-977-8109

Return to Index of Articles